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A DECADE OF RESEARCH IN VEHICLE REAR LIGHTING: WHAT HAVE WE LEARNED?*

by

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ABSTRACT

Rear-end collisions account for about 25% of all highway crashes, but they are a class of collision that is probably more amenable to treatment than others. During the last decade a substantial number of studies have been completed concerning the effectiveness of vehicle rear lighting and signaling. Additional studies are presently being conducted, including some field tests to evaluate the rear-end accident reducing potential of some experimental concepts. This paper provides an overview of some of the marking and signaling research work carried out since 1967, emphasizing the author's work, using analytical methods, simulators, and field testing, and presents data on such topics as separation of lamps by function and color, day-night intensities of signal lamps, coasting and deceleration signals and other specific signaling concepts, and accident data analyses. On the basis of these data the information required by drivers of following vehicles to avoid rear end collision is suggested, including the means of displaying such information by the vehicle rear lighting and signaling system.

INTRODUCTION

Ten years ago a report was given to the American Association for Automotive Medicine (AAAM) concerning the fundamental considerations in the develop-

ment of automotive signaling systems. (1).** The emphasis in that paper was placed upon psychological facets, which clearly are of importance in developing information systems, of which the vehicle rear lighting system is one kind. Emphasis was placed on indicating the difference between primary and augmenting cues, the means available by which light signals could be coded to present information, the types of information presented by vehicle rear lighting systems at that time, and a listing of other messages that might be useful.

Much work in vehicle rear lighting and signaling had been completed before then, but a major impetus to research came after the passage of the Highway Safety Act in 1966. Among the earliest projects supported by the U.S. Department of Transportation were a number concerned with vehicle rear lighting and signaling, which seemed eminently reasonable. This is because rear end crashes account for a significant proportion of all vehicle crashes. Estimates differ somewhat, depending upon the accident data being evaluated, but rear end crashes undoubtedly account for at least 25% of all motor vehicle crashes and 40-50% of all two-vehicle involvements (2, 3). Rear end crashes, while very frequent, are not as severe as many other types of crashes (4), although in Washtenaw County, Michigan, during 1968-1971, Mortimer and Post (2) reported that about 36% resulted in injury and 0.2% in death. According to States (5), 33% of all Monroe County, New York, accidents were

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** Numbers in parentheses designate references at the end of this paper.

rear end crashes, and 0.3% of them involved a fatality. Carlson (3) reported that 33% of rear end crashes resulted in injury and 0.12% resulted in a fatality.

In 1967, four major projects were initiated by the National Highway Safety Bureau at the University of California, Berkeley (6); the University of California, Los Angeles (7); Ohio State University (8); and Bolt, Beranek and Newman, Inc. (9). Those studies produced some recommendations, sometimes at variance with each other, but nevertheless emphasizing certain important themes. First, they provided extensive reviews of literature of prior work in this area relevant to the development of improved rear lighting systems. They also emphasized better utilization of coding techniques for signal lamps, concepts for improving the alerting quality of signals such as separating lamps according to function, developing better standards on the intensity of signal lamps for use in day and nighttime, and innovative concepts concerned with new types of messages to be displayed. Another aspect of these studies, and some that had been carried out previously, was that they demonstrated that objective measures could be used in the evaluation of vehicle lighting systems.

Besides these initial studies under U.S. Department of Transportation sponsorship, a number of other studies, supported by the National Highway Traffic Safety Administration as well as the Automobile Manufacturers Association, were conducted during the late 1960s. Furthermore, the continuous activity of the lighting committee of the Society of Automotive Engineers can be seen in the revisions to the various recommended standards of SAE and the addition of new ones. However, there have been few new rules issued by the U.S. Department of Transportation for marking and signaling systems of motor vehicles. Among the more conspicuous contributions are the mandatory side marker lamps, or more correctly the need to properly provide illumination to the side of the vehicle for nighttime visibility, and increasing the minimum intensity and area of automobile stop/turn lamps. Proposals for more extensive revisions to Federal Motor Vehicle Safety Standard No. 108 have been under consideration for a number of years, and it is likely that some significant changes may be promulgated in the near future. Many changes have already been incorporated by the revisions and additions made in SAE recommended practices. Among the latter are recommended practices for the intensity, location, and function of high-mounted rear stop and

turn signal lamps (SAE J-186); side turn signal lamps for trucks and passenger cars (SAE J-914); the location of front turn signal lamps with respect to the headlamps (SAE J-588); revisions to the performance of reflex reflectors (SAE J-594); and incorporation of a zonal concept of measurement of the intensity of marking and signaling lamps (SAE J-256).

VISIBILITY AND CODING OF SIGNALS

Among the studies completed during the last decade were a number concerned with factors affecting the visibility of marking and signaling lamps and the coding of lamps to enhance their alerting quality and identifiability.

The Intensity of Signal Lamps

Extensive studies have dealt with the requirements for the intensities of stop and turn signal lamps (6, 10, 11). The effect of these studies is to clearly reiterate what earlier investigations by the Automobile Manufacturers Association Vehicle Lighting Committee had already found: namely, that it was highly desirable to have different intensities during the day and at night. Day intensities should be high enough to make signal lamps visible when sunlight is impinging on them, while at night the intensity of signal lamps needs to be limited to control discomfort glare. The requirements for the intensities of signal lamps of different colors, such as red, yellow, or green-blue, have been defined (10). Subsequently, that work was extended by considering the needs for intensity of signal lamps as a function of the type of rear lighting system with which they are associated (11). It was shown that the nature of the rear lighting system, in terms of the signal lamp coding (functional separation, color) which it used, had an impact upon the needed intensity in the day and night. Table 1 shows the recommended minimum and maximum intensities at night and the minimum in the day for presence, stop, and turn signal lamps for three generic types of rear signaling systems. System A has one red lamp on each side that performs presence, stop, and turn signal functions. System B has two red lamps on each side. One pair of lamps provides the stop signal only, while the other pair provides presence and turn signals. Signal C has three lamps on each side—yellow turn lamps, red stop lamps, and green-blue presence lamps. It can be seen that the night maximum intensities are less than the minimum day intensities, showing the

need for different night and day intensity ranges. Stop lamps should not exceed 190 candles at night. (The present standard allows a maximum of 300 cd.) In daytime more than 300 cd is needed. The present system (A) found on most U.S. automobiles cannot be used satisfactorily, since it requires a minimum of 300 cd for adequate identification of signals at night, while 190 cd should not be exceeded at night to control discomfort glare. The same problem did not arise with System B, using functional separation of stop and turn lamps, and System C, using complete functional separation and color coding.

Functional Separation and Color Coding

A series of studies were carried out involving two vehicles, in car-following situations on urban streets and interstate highways at night (1, 12), to evaluate a number of rear lighting and signaling systems that differed in the manner in which they utilized separation of function of lamps and/or color coding. The performance measures used were the time to detect and respond to stop and turn signals given singly, or in combination, as well as the frequency with which drivers responded in error in identifying stop or turn signals, and the frequency of signals that were missed. Those studies consistently showed that, compared to the conventional U.S. rear lighting system in which stop, turn, and presence (tail) signals are given by the same lamps, functional separation was a useful concept. For example, this might involve having one pair of lamps that carried out only the stop signaling function, while the remaining two lamps acted as presence and turn signal lamps. The most effective systems were those that used complete functional separation, requiring six lamps, as well as having different colors for each of the functions. The colors used in

such signals were green-blue for presence lamps, yellow for turn signal lamps, and red for stop lamps.

Colors of Marking and Signaling Lamps

It is a well-known characteristic that both normal and color-blind individuals will confuse some colors more than others. This fact adds some complication to the use of more than one color in vehicle rear lighting systems. While European vehicles have used yellow turn signals and red stop lamps combined with red presence lamps on the rear of the vehicles for many years, it is well established that yellow and red are readily confused. One study (1) found that, in 24% of trials in which yellow lights were shown to drivers with normal color vision, they reported seeing red, while color-blind individuals reported seeing red in 46% of the trials. Green-blue is rarely confused with red or yellow, and ostensibly would seem to be a suitable color for the rear marking of motor vehicles. However, some colors in the green-blue region are confused with white, which would pose a potential hazard in identifying a car traveling in the same direction as one that might be approaching.

For this reason, laboratory experimentation was done (11) under mesopic viewing conditions to define the boundaries of potentially suitable green-blue, red, and yellow colors that would be confused minimally with each other or with white. Suitable chromaticity coordinates of such colors were derived. It seems, therefore, that a suitable set of three colors on the rear of motor vehicles could be used that would not be confused with headlights of oncoming traffic, and minimally with each other, by color normals or dichromats.

In some parts of the country fog is a serious problem leading to rear end collisions. The visibility

Table 1. Day and Night Intensities (Candelas) of Signal Lamps (11)

Signal Lamp	System Type					
	2 Lamp ¹ (Red)		4 Lamp ² (Red)		6 Lamp ³ (G-B, R, Y)	
	Night Min	Day Max	Night Min	Day Max	Night Min	Day Max
Presence -----	4-15		4-15		4-15	
Stop -----	300-190	300	80-190	300	80-190	300
Turn -----	185-285	300	185-285	300	80-320	425

¹ Presence, stop, turn combined.

² Presence and turn combined, stop separate.

³ Presence—green-blue, stop—red, turn—yellow.

of vehicle rear marking lamps and signal lamps in fog is therefore an important consideration. It had been argued that red is the most effective color for penetration in fog, but consideration of the physical characteristics of water droplets, of which fog is composed, suggests this may not be the case. Experiments have shown that green-blue and red are equally visible in night fog (13). In day fog, Finch (6) showed that red was more visible, which would be expected based on contrast but not on transmissivity.

The effect of the light wavelength appears to be a minor variable compared to the effect of fog density upon light transmission. The major lamp variable that affects visibility in fog is the intensity, as demonstrated by Moore and Ruffel-Smith (14) and others (6, 13). Since the relationship between visibility of signal lamps in fog and their intensity is basically an exponential one, large increases in intensity are required to achieve modest increases in visibility of signal lamps in fog. For example, Finch (6) has suggested that rear marker lamps should have an intensity one tenth that of rear signaling lamps, but that lamps to be used in fog should have an intensity at least one hundred times that of normal rear marking lamps. Thus, rear fog marker lamps would require an intensity of about 500 candelas to offer any marginal improvement in visibility under fog conditions.

Flash Rate of Turn and Hazard Warning Signals

A recent study (15) examined the current standards for the flash rate of turn and hazard warning signals and carried out subjective and performance evaluations of alternative flash rates and duty cycles. The results of the study suggest that one revision to the current standard on turn signal and hazard warning signal flasher performance would be to allow flash rates between 1-3 Hz instead of only 1-2 Hz. The higher flash rates (2-3 Hz) were found to improve the effectiveness of turn and hazard warning signals.

INFORMATION TO BE DISPLAYED

A decade ago (1) the messages displayed by the rear marking and signaling system were presence (tail lights), brake, turn, backup, and hazard warning. This message content has not changed in the intervening years. At the same time, other messages that might be useful have been suggested. These are deceleration (coasting), deceleration (panic stop), de-

celeration rate, acceleration, stopped vehicle, and speed.

In the interim, some research has been completed dealing with the effectiveness and means of displaying these kinds of information.

Coasting Signals

Coasting signals have intuitively been considered to be useful in displaying information that a driver has released the accelerator. It has been felt that such signals would provide early warning that braking was to follow and give the following-car driver an opportunity to begin braking earlier, before the stop signals on the vehicle ahead were lighted. In addition, it was felt that coasting in itself would result in a reduction in speed of the vehicle ahead, for which there is presently no signal, and that a coasting signal could help reduce rear end collisions due to drivers not perceiving the reduction in headway.

A study (16) evaluated the coast-down speed-time histories of a number of vehicles differing in weight and having manual and automatic transmissions. In this way, the decelerations that could be expected in vehicles during coasting from various speeds were assessed. At 70 mph, coasting decelerations were of the order of 3 ft/sec², while at lower speeds the decelerations in coasting were reduced, being about half this value for coasting beginning at 30 mph. Thus, coasting decelerations are generally low in value.

The study also involved an experiment in which drivers followed a vehicle that would occasionally coast from various speeds, and their ability to detect this event was measured. The results indicated that the ability to detect coasting of a leading vehicle was dependent upon the initial distance between the vehicles, with a change of approximately 12% in the initial headway being necessary, on the average, for the change in the gap between the vehicles to be noticed.

The study also involved the recording of the durations of coasting in normal driving, the change in speed incurred by the vehicle during these time periods, as well as the control action of the driver in returning to the accelerator or applying the brake after release of the accelerator. These data showed that in 90% of coasting events, the coasting time was less than 5 sec (in 75% it was less than 2 sec) and the vehicle slowed less than 4 mph, and the driver applied the brakes after releasing the accelerator on fewer than half the occasions.

These findings indicated that a coasting signal lamp would go on with a very high frequency if it was activated every time the accelerator was released and, therefore, it would be a possible source of distraction, especially in dense traffic; and, on most occasions, it would provide no useful information of a reduction in speed of the vehicle. Furthermore, a coasting signal could not be taken to indicate that braking would follow. It was estimated in another study (9) that on at least 80% of occasions when the accelerator was released the brake should be applied if drivers were to utilize the coasting signal as one which would reliably alert them to impending braking. Therefore, it was recommended that coasting only be signaled if the coasting time exceeded 5 seconds, when it was also found that braking usually followed.

Accelerator Position Signal

Another concept that has been suggested is a signal that would indicate if the driver was depressing the accelerator or had released it, and an added signal to indicate braking. For example, Rockwell and Treiterer (17) evaluated what they termed the "tri-light" system, which operated in that fashion. In comparison with the conventional rear lighting system, it was found that there was an improvement in the response time of the following driver to detect coasting when the yellow light was turned on, but there were no measurable improvements in car-following performance. A recent simulator and driving evaluation of this signal found that it provided no benefits.

Deceleration-Panic Stop Signal

A signal that would indicate that a vehicle is undergoing an unusually high level of deceleration, such as 0.3 g, is intuitively useful. But driving simulator evaluations of the responses of drivers to such signals, in terms of various following-car measures and driver response times, indicated that there are no significant benefits to such a signal (18). Driving studies by Rutley and Mace (19) also could not discern that drivers could respond more effectively when given such a signal compared to the conventional rear lighting system.

Deceleration-Rate Signal

While the previous concept involved a signal indicating that some limit of deceleration had been exceeded, it would also be feasible to provide signals that would indicate the rate of deceleration in braking, in a number of discrete steps or in a continuous manner.

Voevodsky (20) evaluated such a signal, consisting of a yellow lamp mounted at the center rear of the vehicle just above the rear bumper, which would flash at 1 Hz whenever the brake was applied and up to 7.6 Hz when the deceleration level reached 0.5 g. Such lamps were mounted on a fleet of taxis in San Francisco, and the rear end collision experience of those vehicles was compared with a control group in the same fleet. He found a dramatic reduction of over 60% in the rear end collisions of the vehicles equipped with the deceleration magnitude signal. However, this impressive finding cannot necessarily be attributed to the characteristics of the signal that indicated level of deceleration. Since the signal was activated whenever the brakes were applied, it also acted as an additional braking signal that was extremely prominent because of its color (yellow) and high intensity (1,200 candelas compared with 300 candelas maximum for conventional brake lamps). In fact, in about 50% of the rear end collisions involving the cabs, it was reported that the vehicle was stopped prior to being struck.

Stopped Vehicle and Speed Signals

It has been suggested (1) that a signal indicating that a vehicle is stopped and signals indicating the speed of the vehicle might be useful. As just indicated concerning the evaluation of the deceleration-rate signal, many vehicles struck in rear end collisions are actually stopped prior to impact. This suggests that drivers are poor sensors of relative velocity, which is necessarily greatest when one vehicle is at rest.

In many other cases there is a substantial disparity in speed between the vehicles (24). An example of such a situation was given by Thompson *et al.* (26). In one of their MDAI cases a passenger car traveling at 50 mph impacted the rear of a truck moving at 20 mph. Data by Solomon (21) showed that when the disparity in speed between two vehicles traveling in the same direction exceeded 20 mph, there was a sharp rise in the probability of rear end collisions. Such data also show that drivers are poor at judging relative velocities.

Evaluation of rear end collision data from multidisciplinary accident investigation studies by Perchonok (22) have indicated that in over 50% of rear end collisions the struck and striking vehicles were in an "uncoupled" state. A recent analysis of Washtenaw County, Michigan, mass-accident data also showed that

in more than 80% of rear end collisions the struck vehicle was traveling at 20 mph or less (23). These data clearly support the importance of a display indicating the speed of a vehicle and, particularly, an indication that the vehicle is stopped.

A CONCEPT FOR A REAR LIGHTING SYSTEM

Figure 1 shows a potential concept for an improved vehicle rear lighting system that is based on the prior review of basic rear lighting system design considerations and the evaluation of information that is likely to be most useful to following-car drivers. The system consists of high-mounted presence lamps, which are green-blue, mounted above the row of presence/speed indicator lamps. Such lamps, augmenting low-mounted presence lamps, have been found to improve the sensitivity of following drivers to the change in headway between the vehicles (10). Yellow turn signal lamps are mounted high on the rear deck and outboard, while red stop lamps are mounted low on the rear deck and outboard. Combined with the stop lamps is a coasting signal, which can be the same as the braking signal, but which operates only after a 5-sec delay from the time the accelerator is released. This is to ensure that only about 10% of all accelerator releases are indicated, in most of which it was found that release of the accelerator was followed by braking. The speed display incorporates a red lamp in the lower center of the rear deck that is lighted whenever the speed is below 5 mph. Six green-blue presence/speed lamps are operated day and night, with the inboard pair being lighted whenever the speed is below approximately 30 mph, the next outboard pair being lighted whenever the speed is approximately less than 50 mph, and the outboard pair of green-blue lamps always being lighted. Thus, as speed decreases below approximately 50 mph, two or four additional green lamps are lighted, with the red lamp also being lighted whenever speed falls below 5 mph. Research has been completed (24) to indicate that drivers can readily identify the speed display.

The system utilizes the concepts of functional separation of lamps as well as color coding. The day and night intensities of the lamps would correspond to those shown for the 6-lamp type of system in Table 1. Preliminary computer simulation evaluations of such a system, embodying the display of vehicle speed shown in Figure 1, have suggested (25) that it could be effective in reducing rear end collisions.

CONCLUSIONS: WHAT HAVE WE LEARNED?

The incomplete discussions of research and evaluation during the past decade that has been presented should indicate that much has been accomplished. A better understanding of the conditions in which rear end collisions occur and the experimental study of various signal messages have provided a basis for describing the information needed by following drivers or those approaching another vehicle from the rear. Many basic characteristics of marking and signaling lamps, such as colors, locations, intensities, and coding methods, have also been defined.

The major work remaining to be done is to evaluate, and reduce to a minimum, the signals which will provide drivers with the information needed to avoid or reduce rear end collisions. That task can be successfully completed well before another decade has elapsed.

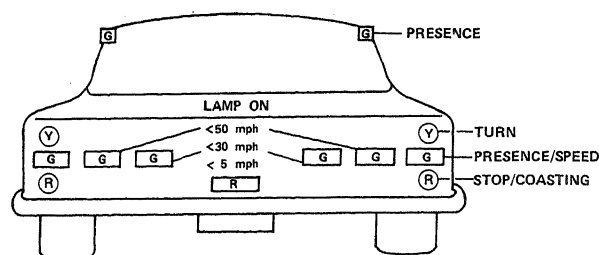


Figure 1. Proposed rear lighting and signal system.

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ABSTRACT CITATIONS

SAMPLE ENTRIES

FORMAT OF ENTRIES IN HIGHWAY SAFETY LITERATURE

NHTSA accession number ----- HS-013 124
Title of document ----- **MAXIMUM BRAKE PEDAL FORCES PRODUCED BY
MALE AND FEMALE DRIVERS**
Abstract ----- The object of this research was to obtain data concerning the
maximum amount of brake pedal force that automobile drivers
were able to sustain over a period of ten seconds. Subjects
were told to apply the brakes in the test car as they would in a
panic stop, and to exert as much force as possible on the
pedal over the entire ten second test period. A total of 84 sub-
jects were tested, including 42 males and 42 females. The
results indicated that there is a wide distribution of values
which characterizes the pedal force that the subjects were able
to generate. Male subjects produced generally higher forces
than did females. Over half the women tested were unable to
exert more than 150 lbs. of force with either foot alone, but
when both feet were applied to the pedal, force levels rose sig-
nificantly.
Personal author(s) ----- by C. R. VonBuseck
Corporate author (or author's affiliation) ----- General Motors Corp.
Publication date; pagination ----- 1973? ; 18p
Supplementary note ----- Excerpts from Maximum Parking Brake Forces Applied by
Male and Female Drivers (EM-23) BY R. L. Bierley, 1965, are
included.
Availability ----- Availability: Corporate author

NHTSA accession number ----- HS-018 924
Title of document ----- **NATURAL FREQUENCIES OF THE BIAS TIRE**
Abstract ----- The lowest natural frequencies of a bias tire under inflation
pressure are deduced by assuming the bias tire as a composite
structure of a bias-laminated, toroidal membrane shell and
rigorously taking three displacement components into con-
sideration. The point collocation method is used to solve a
derived system of differential equations with variable coeffi-
cients. It is found that the lowest natural frequencies calcu-
lated for two kinds of bias tire agree well with the correspond-
ing experimental results in a wide range of inflation pressures.
Results of the approximate analysis show that the influences
of the in-plane inertia forces on natural frequency may be con-
sidered small, but the influences of in-plane displacements are
large, particularly on the natural frequency of the tire under
low inflation pressure.
Personal author(s) ----- by Masami Hirano; Takashi Akasaka
Journal citation ----- Pub!: Tire Science and Technology v4 n2 p86-114 (May 1976)
Publication date ----- 1976; 6refs
Availability ----- Availability: See publication

AN EXPERIMENTAL INVESTIGATION OF A COAL-SLURRY FUELED DIESEL ENGINE

A single cylinder 1360 cc diesel engine was operated on a slurry of 15% by weight solvent refined coal and jet fuel. The coal was pulverized to a nominal size of 2 micrometers. The initial investigation began with nozzle bench tests which ascertained that the slurry would flow through the injection nozzle and form acceptable spray patterns. An instrumentation system was assembled to monitor and record engine operating conditions, which included pressure-time fluctuations in the combustion chamber, fuel consumption, power output, and noise. Photomicrographs of the injection nozzle pin and injection pump plunger are presented for wear comparison before and after slurry operation. Test results indicate that the slurry fuel provides engine power and fuel consumption levels comparable to those of diesel and jet fuels. Although wear rates appeared moderate, conventional fuel injection systems are inadequate for long-term use because the clearances in the injection pump and nozzle are too small for slurry operation. New injection pump and nozzle designs that prevent seizure due to clogging will be required for continuous operation of diesel engines on slurry fuels.

by H. P. Marshall; D. C. Walters, Jr.
Virginia Polytechnic Inst. and State Univ., Blacksburg, Va.;
Walters Repair and Restoration
Rept. No. SAE-770795; 1977; 12p 3refs
Presented at Passenger Car Meeting, Detroit, 26-30 Sep 1977.
Availability: SAE

HS-024 765

STUDY OF MIXTURES OF METHANE AND CARBON DIOXIDE AS FUELS IN A SINGLE CYLINDER ENGINE (CLR)

A single cylinder four stroke gasoline engine (CLR) was used to investigate the feasibility of using sewer gas as an alternate fuel while modification to the engine was kept to a minimum. The optimum spark timing for sewer gas at all engine speeds tested was more advanced than the corresponding spark timing for gasoline fuel by an average of 10 degrees. The range of satisfactory operating speed of the engine became narrower when sewer gas was used. The narrowing occurred mainly in the low speed range. Results indicated that using sewer gas having quality of 65/35 in methane/carbon dioxide volume ratio on the "as is" basis, engine power losses could be kept below 22% compared to those obtained with gasoline, while improvements in brake specific fuel consumption could be as high as 30% when compared to those obtained with gasoline. Unburned hydrocarbons, nitric oxide, and carbon monoxide emissions were reduced when sewer gas was used.

by John K. S. Wong
National Res. Council (Canada)
Rept. No. SAE-770796; 1977; 12p 26refs
Presented at Passenger Car Meeting, Detroit, 26-30 Sep 1977.
Availability: SAE

HYDROGEN-FUELED TURBINE BOAT DEMONSTRATION

One of two United Aircraft of Canada Ltd. Model ST6B-68 gas turbine engines, that power a 36-foot Swimmer Reconnaissance Craft, was modified to burn hydrogen fuel. The fuel nozzles and sheaths of the natural gas conversion kit were modified to eliminate combustion chamber hot spots and a higher sparking rate igniter helped eliminate "pop" starts. The project has demonstrated that the minimum modifications for a hydrogen conversion affect not only the fuel rate controls, but, for a specific design of combustion chamber, may also require the modification of fuel and/or air flow patterns. Although fuel rate can be adjusted for hydrogen fuel to produce turbine inlet temperatures equivalent to liquid hydrocarbon fuel, such adjustment does not ensure that localized regions of critical temperatures will not be produced by the hydrogen flame on the combustion chamber liner. In the case of this test, the hot spot problem has been solved, but each turbine of different design will have to be examined. As a result of the modification made to the natural gas conversion kit, the port turbine was operated safely at full marine rated power, 350 hp (260 kilowatts), and speed. The turbine combustion chamber liner actually ran cooler burning hydrogen than when burning diesel fuel. All problems that occurred during boat operation were in no way related to the hydrogen-fueled turbine or combustion of hydrogen.

by Allen E. Ford
David W. Taylor Naval Ship Res. and Devel. Center
Rept. No. SAE-770797; 1977; 8p 6refs
Presented at Passenger Car Meeting, Detroit, 26-30 Sep 1977.
Availability: SAE

HS-024 767

ADVANCED DRIVER TRAINING--WE CAN LIVE WITH IT

In the evolution of driver training programs, competency learning skills have replaced the basic knowledge of insurance, tire changing, and parking. This change is due in part to the increased complexity of the highway system and in part to budget considerations. "Survival driving", "crash avoidance", and "emergency driving skills" are terms used to describe advanced driver training now being offered in Kansas. The development of advanced driver training has been advanced by the automobile industry, insurance companies, and the armed forces. Each of the 24-hour advanced driving courses offered in Kansas deal with perception and maneuvering, control braking, braking and maneuvering, evasive maneuvers, vehicular control (off-road recovery and skid control), and trailing. In the three years in which the advanced driving skills program has been in effect, over 5000 students and adults have successfully mastered the skills.

by Gerald Christensen
Kansas State Dept. of Education
Rept. No. SAE-770799; 1977; 8p
Presented at Passenger Car Meeting, Detroit, 26-30 Sep 1977.
Availability: SAE

HS-024 768

ADVANCED DRIVER TRAINING EVALUATION AND DEVELOPMENT

Recent developments are summarized for improving driver performance in crash avoidance, including a large-scale evaluation of advanced driver training and an analytical study of the driver's role in avoidance situations. Evaluation data and experience were gained by conducting training using three of the best available off-the-shelf advanced driver training programs. Program evaluation data included subjective reactions of trainees, performance during training, effect of training on off-road tests, accident experience, and cost-benefit analysis. The resulting analytic study on the benefits and nature of accident avoidance training included the following facets: accident situation definition, conflict nullification potential, and maneuvering potential. It was found that perceptual and response selection behaviors should be emphasized in crash avoidance training. Perceptual skills include the judgment of intervehicle closure, judgment of clearance between vehicles, judgment of direction of vehicle motion, and perception of surface condition. Based on analytic, empirical, and benefit analyses, it is concluded that advanced driver training appears to have promise as an accident avoidance countermeasure.

by Richard F. Pain
BioTechnology, Inc.
Rept. No. SAE-770801; 1977; 16p 24refs
Presented at Passenger Car Meeting, Detroit, 26-30 Sep 1977.
Sponsored by National Hwy. Traffic Safety Administration.
Availability: SAE

HS-024 769

A REALISTIC APPROACH TO AUTOMOBILE ACCIDENT AVOIDANCE TRAINING

A different approach to training automobile accident avoidance driving skills is being developed. It is structured to provide students the opportunity to practice selecting and implementing effective crash avoidance strategies in response to realistic conflict situations that often precede actual accidents. Two new teaching techniques have been developed to provide this realistic experience in dealing with both single-car (the student driver's) and two-car situations. These techniques are used to administer a seven-module driver training course. The previously selected evaluation criteria for candidate training exercises and techniques included knowledge and skills in advanced vehicle handling, impact point prediction, roadway occupancy information acquisition, and accident avoidance strategy selection. The first module subjects the student drivers to a battery of static driving exercises to develop drastic maneuver execution skills, and requires the student to avoid various "surprise" obstacles analogous to those preceding a single-car accident. Modules two through six place the student driver into developing two-car accident situations, carefully controlled and structured to provide the necessary learning experience. The seventh module is used for testing student progress and for evaluating teaching techniques.

by James R. Bathurst, Jr.
Essex Corp.
Rept. No. SAE-770802; 1977; 8p
Presented at Passenger Car Meeting, Detroit, 26-30 Sep 1977.
Availability: SAE

HS-024 770

DEVELOPMENT OF A FRONT-WHEEL-DRIVE CAR

The design of a front-wheel-drive (FWD) automobile with a horizontally opposed four-cylinder engine has resulted in a vehicle with proper weight distribution for good gradeability, and front wheels having six degrees of freedom of motion because of constant-velocity, standing universal joints. The type of engine chosen results in less vibration and noise level at higher engine revolutions, and its low center of gravity results in better roadholding and riding comfort. There is a longer energy-absorbing crush distance of engine compartment due to the short length of the engine; safety for 40 mph frontal barrier crashes is ensured without an increase in vehicle length. The engine hood has more effective energy-absorbing characteristics so that pedestrian safety is improved. The vehicle's braking systems and steer force compare favorably with those of a comparable rear-wheel-drive vehicle.

by Rempei Matsumoto; Gyo-ichi Hataya; Mamoru Morinaga; Teruhisa Tsukada
Fuji Heavy Industries, Ltd., Subaru Technical Center
Rept. No. SAE-770803; 1977; 24p 16refs
Presented at Passenger Car Meeting, Detroit, 26-30 Sep 1977.
Availability: SAE

HS-024 772

THE ROLE OF FHWA [FEDERAL HIGHWAY ADMINISTRATION] IN HIGHWAY SAFETY, 1964-1976

The role of the Federal Hwy. Administration (FHWA) is described since 1964, when the highway safety improvement program was initiated. Although motor vehicle registrations and vehicle miles travelled both increased 59% between 1964 and 1975, and the total number of accidents increased 34%, vehicle accident deaths decreased 4%, the mileage death rate decreased 39%, and the total accident rate decreased 16%. Due to the interaction of the highway, the vehicle, and the driver, it is impossible to assign specific results to such programs as the Spot Safety Improvement Program (highway improvements at high accident sites), Railroad-Highway Program (to eliminate crossing hazards), the TOPICS Program (traffic engineering techniques for improving highway safety), and other programs initiated by FHWA. Some of the other programs involve bridge replacement, pavement marking, elimination of road obstacles, and a uniform national speed limit. Highway design for promoting safety includes such roadside features as impact attenuators, guardrails, median barriers and bridge rails, as well as breakaway sign and luminaire supports. Skid resistance on roadway surfaces is being promoted at skid prone locations. Uniform standards for traffic control signs, signals and pavement markings are being developed, as is proper highway illumination. The 1977 FHWA program includes development of a system to set safety priorities, improving safety at highway maintenance and construction zones, marking of all railroad crossings, increasing the use of Federal-aid funds for safety improvements, and obligating funds provided in the Highway Safety Act of 1973. Long term goals (1990-2000) are to remove, shield, or modify all hazards on the Interstate system which could lead to fatalities from an out-of-control vehicle; to provide active warning devices at railroad-highway grade crossings, with passive devices as a minimum at less dangerous crossings; to provide skid-resistant

Aug 31, 1979

HS-024 775

surfaces on all highways in the Federal-aid Primary System; and to illuminate all hazardous intersections.

Federal Hwy. Administration, Washington, D.C.
1977; 29p refs
Availability: Corporate author

HS-024 773

DEVELOPMENTS IN THE NATIONAL HIGHWAY SAFETY PROGRAM OF THE UNITED STATES

The National Hwy. Safety Program of the U.S. began as a nationwide spot improvement program in 1964, with Federal financial assistance to improve high hazard locations on highway systems. The program has been expanded to include the correction of other high hazard locations, the elimination of roadside obstacles, and railroad-highway crossing improvements. Roads outside the Federal aid system are now included. The Federal-Aid Hwy. Act of 1956 directed a study which resulted in a proposal, since implemented, for establishment of a National Driver Records Clearance Center to identify drivers whose licenses had been suspended or revoked. A second proposal, implemented in 1960, was to establish an Interdepartmental Hwy. Safety Board to coordinate all official Federal highway safety programs. In 1966, Congress enacted the first Hwy. Safety Act, which required each state to have a highway safety program in accordance with uniform standards in such areas as driver performance, pedestrian control, accident records systems, accident investigation, highway design and maintenance, traffic control devices, vehicle codes and laws, emergency services, and systems to identify and correct high hazard locations. An encouraging reduction of 13.3% in motor vehicle traffic fatalities from the 54,000 recorded in 1973 is attributed partly to improved safety devices and new highway programs, and partly to the 55 mph (88 kph) national maximum speed limit. Since 1966, nearly 65 million vehicles have been recalled because of defects ranging from those in braking and steering systems to possible hazards from fuel tanks. A conference was held in 1976 as part of an effort to evaluate the adequacy and appropriateness of all uniform safety standards. Recommendations emerging from the conference included the following: that states should be given more latitude and flexibility to develop their own highway safety programs, although Federally funded programs would have to comply with uniform national requirements; that state governors should remain responsible for administration of state highway safety programs; that 40% of Federal funds granted to a state be used in local cities and towns; that the Federal government encourage dissemination of research results; and that the private sector work more closely with Federal, state and local governments to achieve highway safety.

by James K. Williams
Publ: Transportation Research News n79 p9-12 (Nov-Dec 1978)
1978
Condensed from paper presented at 2nd World Safety and Accident Prevention Congress, Singapore, 11 Jul 1978.
Availability: See publication

HS-024 774

EVALUATION OF BATTERY MODELS FOR PREDICTION OF ELECTRIC VEHICLE RANGE

An evaluation was made of three different battery analytical models to predict electric vehicle battery output and the corresponding electric vehicle range for various driving cycles as described by SAE-J227a. The approach used the models to predict output and range, then compared the results with experimentally determined values. The latter were determined by laboratory tests on batteries, using discharge cycles identical to those encountered by an actual electric vehicle while on the SAE cycles. Results indicated that the so-called Modified Hoxie Model gave the best predictions with an accuracy of about 97-98% in most cases and 86% in the worst case. This result is due to the fact that this model takes into account battery recuperative effects while the other models (Fractional Utilization Model and Shepherd Model) do not. Range prediction via the Modified Hoxie Model is quite simple and rapid once the computer program has been written to solve the model's iterative calculations. The computer program written for the model is included. Also described are the program and hardware used to discharge the battery automatically in accord with the current profiles corresponding to the SAE driving cycles. Future efforts are recommended using these models to predict the effect of battery type on range of a wide variety of vehicles. Included would be prediction for the Ripp-Electric Vehicle with batteries other than the EV-106's, such as nickel/zinc, nickel/iron, zinc/chloride, zinc/bromide, iron/air, sodium/sulfur, and lithium-aluminum/ferrous sulfide batteries; range predictions for other electric vehicles, and for advanced electric vehicles yet on the drawing board.

by H. A. Frank; A. M. Phillips
California Inst. of Tech., Jet Propulsion Lab., 4800 Oak Grove Drive, Pasadena, Calif. 91103
NAS-7-100
Rept. No. JPL-77-29; NASA-CR-155045; N77-32593; HC-AC4/MF-A01; 1977; 68p 6refs
Availability: Corporate author

HS-024 775

TRANS TUNE [AFFORDABLE AUTOMATIC TRANSMISSION TUNEUP]

Although owner's manuals recommend that the automatic transmission fluid and filter be changed every 60,000 miles, this service should be performed every 15,000 miles under some conditions. The procedures of an automatic transmission tuneup are described. This routine examination and servicing are intended to prevent major damage resulting from leaks, fluid contamination, improper linkage or band adjustment, and neglect. The filter should be replaced as part of the transmission tuneup as well as replacing the fluid and inserting a new gasket on the pan. It is stated that 90% of the problems leading to transmission overhaul are caused by failure to replace the fluid and filter at the right time. Sludge forms in the transmission as a result of overheating, moisture, severe usage, and a breakdown of the protective chemicals in the transmission fluid. Heat is the major enemy of the automatic transmission, since it encourages the formation of gum and varnish around the valves and the precision passages in the valve body. It is recommended to the garage owner and mechanic that trans-

HS-024 776

mission tuneup service be advertised and that the cost be kept as reasonable as possible.

by Bob Cerullo

Publ: Motor v150 n5 p32-4, 67-8 (Nov 1978)
1978

Availability: See publication

HS-024 776

SEAL STORY [AUTOMOTIVE SEALS]

A seal is defined as a barrier designed to retain lubricants or liquid, to confine pressure, to exclude dirt, and to separate fluids. Seals, in order to be effective, require proper handling and storing techniques, and expert installation, as well as correct seal selection. Oil seals function in every type of condition encountered by powered mechanisms, from a track-type earthmover operating at 15-30 rpm to a high speed turbine pump that accelerates from 0 to 12,000 rpm in a quarter-second. Some seals must perform retention and exclusion functions at the same time. A common example is the basic front wheel seal, which must retain lubricating fluid and simultaneously shield the spindle and bearings from water, dirt and abrasives. Basic designs for seals include non-spring loaded seals for grease retention or dirt exclusion in lower speed applications; single-lip, spring loaded seals without inner cases for engines, drive axles, transmissions and pumps; spring-loaded designs with inner cases used for greater strength and protection of the sealing lip; dual-lip, single element designs without inner cases, designed for applications where the sealing lip requires protection; and external seals that press fit on the shaft and seal the bore surface. Formerly, when leaking seals were discovered, there was shaft damage requiring expensive grinding, polishing, or replacement. Wear sleeves are now available, which are precision made, precision ground, heavy gauge steel sleeves that can be press fitted on the shaft where the seal must operate to provide the smooth sealing surface. Truck mechanics have found wear sleeves essential for efficient and economical rear axle repairs, as well as to repair front crankshaft scoring. Other applications of wear sleeves include U-joint yokes, tractor steering clutch assemblies, crankshaft rear seals, and cable control units. Proper handling and storage are important to prevent damage to seals, since nitrile, the basic synthetic rubber used in most seals, oxidizes when exposed to heat and ozone. Seals must therefore be kept away from electric motors, welding equipment, fluorescent lights, and direct sunlight. Suggestions for proper storage and installation are provided, as well as a list of seal suppliers to the automobile industry.

by Bob Taylor

Publ: Motor v150 n5 p36, 38-9, 64-5 (Nov 1978)
1978

Availability: See publication

HS-024 777

TRANSIT FACT BOOK. 1977-1978 ED.

Transit industry trends reported are for organizations, both publicly and privately owned, providing urban public transit service in the U.S., including Puerto Rico. Summary tables report operating and financial data for all U.S. transit systems operating motor buses, heavy rail cars, light rail cars, trolley coaches, cable cars, and inclined plane cars. Statistics on such items as system routes, fares, passengers carried, and revenue

HSL 79-08

are given for motor buses, heavy and light rail, trolley coaches, cable and inclined plane cars, commuter rail, urban ferry boats, automated guideways and public paratransit (e.g. dial-a-ride, vanpools, airport limousines). A question and answer section deals with transit's role, its energy use and air pollution, transit size and service, best mode of service, energy used for rail construction, job potential in rail transit vs. potential in urban freeways, the role for paratransit services, cost of not providing service, personal savings due to taking transit, and needed national policy. A glossary of transit industry terms and an index are provided.

by John Neff; Annette Davis; David Judd

American Public Transit Assoc., Statistical Dept., 1100 17th St., N.W., Suite 1200, Washington, D.C. 20036
1978; 66p

Availability: Corporate author

HS-024 778

EVALUATING BRIDGE STRUCTURES, PAVEMENT MAINTENANCE, ROADSIDE MANAGEMENT, DEICING SALTS, TRANSPORT OF HAZARDOUS MATERIALS

Fifteen studies (six abridgements) on highway transport and maintenance cover laboratory static load tests on five "Sunshine Skyway" bridge girders, basic evaluation of the structural adequacy of existing timber bridges, tests on treatments for reflective cracking, milling and planing of flexible pavement, roadside management in North Carolina, and wildlife considerations in managing highway rights-of-way. Further topics include South Dakota's harvesting of crops in highway rights-of-way, approaches to roadside management, economics of roadside mowing, economic analysis of the environmental impact of highway deicing salts, economic impacts of snow on traffic delays and safety, impact of highway deicing salts on rural stream water quality, advance traffic-control warning systems for maintenance operations, risk assessment for solving transportation problems, and transport of hazardous materials and Docket HM-112.

by Anne Ricker, ed.

Transportation Res. Board, 2101 Constitution Ave., N.W., Washington, D.C. 20418

Rept. No. TRR-647; 1977; 71p

Includes HS-024 779-HS-024 784.

Availability: TRB \$4.80

HS-024 779

WILDLIFE CONSIDERATIONS IN MANAGING HIGHWAY RIGHTS-OF-WAY (ABRIDGMENT)

In many agricultural states, highways provide the only wildlife habitat for miles, as the surrounding land is under cultivation. The soil and planted portions of highway, railroad and utility rights-of-way are estimated to include some 50,000,000 acres of the U.S. State highway agencies and wildlife agencies should work together during both initial planning and construction and also operation and maintenance. Wildlife management along the highway must be integrated with other objectives such as safety, aesthetics, and highway compatibility with surrounding land use. Specific recommendations include fencing off of deer migration routes with underpasses or overpasses provided, rescheduling and reduction of mowing, planting of

species that will provide food and shelter, and development of borrow pits into aquatic and wetland habitats.

by Douglas L. Smith

Federal Hwy. Administration, Environmental Design and Control Div.

Publ: HS-024 778 (TRR-647), "Evaluating Bridge Structures, Pavement Maintenance, Roadside Management, Deicing Salts, Transport of Hazardous Materials," Washington, D.C., 1977 p23-5

1977; 8refs

Availability: In HS-024 778

HS-024 780

ECONOMIC ANALYSIS OF THE ENVIRONMENTAL IMPACT OF HIGHWAY DEICING SALTS

An analysis was made of the cost of damages that result from sodium chloride used to melt snow and ice on highways. An extensive literature search and several surveys were made to determine the types and extent of damages that have occurred. The major cost sectors examined were water supplies and health, vegetation, highway structures, vehicles, and utilities. A conservative cost estimate was developed for each sector; the total annual national cost of salt-related damage approaches \$3 billion, about 15 times the annual national cost of the salt and its application. The highest direct costs result from damage to vehicles, but the most serious damage appears to be the pollution of water supplies and the attendant degradation of health. As it is difficult to assign costs to this, the estimate may substantially understate actual indirect costs to society. Findings indicate that some areas should, on the basis of local conditions, reduce the amount of salt used. The discussion by Belangie and Sy which follows questions the validity of the Anderson-Murray approach and the resulting regression equation as a distributor of the additional depreciation; a correlation between air pollution, the base environment, and corrosion should also be considered. Costs developed are felt to be excessive, though the method used has good potential. In a further analysis, Brenner questions both the accuracy of the figures and the underlying assumptions of the model, stressing the benefits of road salting. The conclusion, written in part by Robert Anderson, reaffirms the estimates as accurate allocations of the measured depreciation rates to the separate determinants of vehicle decay, and the principal finding that the estimate of the cost of vehicle corrosion attributable to deicing salts is probably biased downward.

by Donald M. Murray

Publ: HS-024 778 (TRR-647) "Evaluating Bridge Structures, Pavement Maintenance, Roadside Management, Deicing Salts, Transport of Hazardous Materials," Washington, D.C., 1977 p29-40

1977; 41refs

Supported by Environmental Protection Agency, Municipal Environmental Res. Lab., Cincinnati, Ohio. Includes discussion by M. C. Belangie, C. C. Sy, and Robert Brenner. Availability: In HS-024 778

HS-024 781

ECONOMIC IMPACTS OF SNOW ON TRAFFIC DELAYS AND SAFETY

The effects are described of snow and snow removal on four types of highways: urban Interstate, rural Interstate, urban secondary, and rural secondary, which were studied in a 4-

year project sponsored by 12 "snow" states and the Federal Hwy. Administration. The project employed multiple linear regression analysis and a correlation coefficient matrix for the independent variables to identify and calculate such road-user costs as delay, volume and speed reductions, and fuel consumption; business costs included losses from such things as absenteeism, tardiness and spoilage. The influence of storms on traffic and traffic patterns was more pronounced during the first third of a storm; disruptions tapered off as the storm progressed, though this may not apply to storms of abnormally long duration. The safety aspect of snow and ice control becomes a minor economic effect for short highway segments or those without extremely high traffic volumes. Many vehicle-kilometers must be traveled during and shortly after a storm for the small difference in accident rates for various road surface conditions to have a measurable effect. User savings as a result of snow- and ice-control activities should be made by means of a comprehensive economic analysis that includes the costs of providing higher levels of service. The most extreme service for snow and ice control will still result in user costs. It is not anticipated that for every dollar saved in user costs, a dollar's expenditure to control snow- and ice-covered highways is justified. An incremental benefit-cost analysis is required to determine the point of diminishing returns in providing snow and ice control.

by Bob H. Welch; W. J. Kennedy, Jr.; Roger M. Stewart

Publ: HS-024 778 (TRR-647), "Evaluating Bridge Structures, Pavement Maintenance, Roadside Management, Deicing Salts, Transport of Hazardous Materials," Washington, D.C., 1977 p40-7

1977; 7refs

Availability: In HS-024 778

HS-024 782

ADVANCE TRAFFIC-CONTROL WARNING SYSTEMS FOR MAINTENANCE OPERATIONS

The effects are discussed of sign size, height of sign installation, and sign legend on driver responses measured by speed, conflict, and queuing parameters. Effects of flashing chevrons were also evaluated in terms of these responses. The experiment was conducted on two-lane highways and the Interstate system at four locations. The conclusions, based on the analysis and evaluation of the various responses using standard statistical procedures, are that speed decrease at two-lane locations was greater for the 0.76-m (30-in) signs than either the 0.91-m (36-in) or the 1.22-m (48-in) signs; at Interstate locations, the 0.91-m (36-in) sign yielded better overall response than the corresponding 0.76-m (30-in) signs; installation height of 0.31 m (1 ft) and 1.52 m (5 ft) and sign legend did not indicate any statistical difference in the measured response; two-way flashing chevrons greatly enhanced the obedience of the driver to warning signs; and differences in responses by location can be discussed in terms of traffic volume and the motorists' attitudes toward signing in general.

by S. C. Shah; G. L. Ray

Publ: HS-024 778 (TRR-647) "Evaluating Bridge Structures, Pavement Maintenance, Roadside Management, Deicing Salts, Transport of Hazardous Materials," Washington, D.C., 1977 p52-9

1977; 3refs

Conducted in cooperation with Federal Hwy. Administration.

Availability: In HS-024 778

HS-024 783

HS-024 783

**RISK ASSESSMENT FOR SOLVING
TRANSPORTATION PROBLEMS**

A research program is being conducted by Battelle, Pacific Northwest Labs. to assess the risk of transporting energy materials. The risk assessment model, although originally developed for use in analyzing shipments of radioactive materials, can be used to evaluate the risk of shipping any hazardous material. The method comprises four steps: system description, release sequence identification, release sequence (and severity) evaluation, and risk calculation and assessment. The fourth step is determining the consequences of each postulated release sequence, relating it to its respective occurrence rate, and combining these individual risks for an indication of the total risk system. The technique can identify the main contributors to overall risk, outlining every possible release sequence and the probability of each element of the sequence. Proposed changes in safety regulations can also be evaluated, and the risk spectra of various transportation modes compared.

by J. F. Johnson; R. J. Hall
Publ: HS-024 778 (TRR-647), "Evaluating Bridge Structures, Pavement Maintenance, Roadside Management, Deicing Salts, Transport of Hazardous Materials," Washington, D.C., 1977 p59-63

1977; 4refs

Sponsored by Energy Res. and Devel. Administration.

Availability: In HS-024 778

HS-024 784

**TRANSPORT OF HAZARDOUS MATERIALS AND
DOCKET HM-112 (ABRIDGMENT)**

The omnibus regulatory action (docket HM-112) consists of several hundred different subjects pertaining to the Dept. of Transportation's regulations on the safe transport of hazardous materials. It consolidates all the regulations into a single volume and improves them by making them as intermodally compatible as practicable, eliminating inapplicable and inconsistent requirements. Additional matters addressed are: allocation of one part to hazardous materials communications, documentation, marking, labeling, and placarding; realignment of the regulations applicable to certain hazardous materials that are consumer commodities; elimination of all regulations pertaining to certain materials; complete reissuance and restatement of the modal regulations pertaining to transport of hazardous materials by air, rail and water; addition of four new classes of materials, or other regulated materials, to be subject to certain regulations when transported by air or water or both; requirement that all materials classed as Class B poisons and those materials in other classes also meeting the definition of class B poisons be labeled to identify their hazards even in quantities previously exempt from labeling requirements. The new requirements for poisons, with those relating to hazardous materials communications, constitute a significant increase in the level of regulation imposed under Docket HM-112.

by Alan I. Roberts
Department of Transportation, Office of Hazardous Materials Operations

Publ: HS-024 778 (TRR-647), "Evaluating Bridge Structures, Pavement Maintenance, Roadside Management, Deicing Salts,

HSL 79-08

Transport of Hazardous Materials," Washington, D.C., 1977 p63-5
1977

Availability: In HS-024 778

HS-024 785

**TRAFFIC CONTROL FOR STREET AND HIGHWAY
CONSTRUCTION AND MAINTENANCE
OPERATIONS. TRAINING COURSE. PARTICIPANT
NOTEBOOK. 3RD ED.**

A course is offered providing information, guidelines and tools to help those with traffic control responsibilities to create safe and cost effective procedures for the full range of highway worksite situations. The course, both five- and three-day versions, builds heavily on the Manual on Uniform Traffic Control Devices and stresses the need to keep abreast of its numerous revisions. The course is designed for presentation to Federal, State and local agency personnel, utility and contracting company employees involved in traffic control, and engineers, technicians and supervisory personnel. Exhibits and other resource materials are provided, with workshops and discussion groups. The need for traffic control is considered, followed by sections on planning and design of traffic control devices, the installation and removal processes, the operation of traffic control zones, emergency and disaster conditions, and case studies. A summary and evaluation of the course concludes the training. A list of seven movies is appended.

by Russell M. Lewis; Marshall M. Rich
Byrd, Tallamy, MacDonald and Lewis, Falls Church, Va.
DOT-FH-11-8525

1978; 275p 156refs

Availability: Federal Hwy. Administration

HS-024 786

**A COMPARISON OF MOTOR VEHICLE SAFETY
REGULATIONS UNITED STATES VERSUS
ECONOMIC COMMISSION FOR EUROPE (ECE).
2ND ED.**

The U.S. and Economic Commission for Europe (ECE) regulations are compared in three sections: a summary, listing specific differences between comparable regulations; a side-by-side comparison of the wording of each regulation, with comments; and a description of the general background, applicability, rulemaking procedures, and certification requirements for U.S. and ECE regulations. The regulations cover lamps and turn signals, noise, radio interference, door locks and retention, steering control, brakes, seatbelt anchorages, seat belt assemblies, seating systems, emissions (diesel and spark ignition), theft protection, fog and halogen lamps, interior impact protection, helmets, backup lamps, head restraints, external projections, warning devices, horns, commercial vehicle occupant protection, pneumatic tires, halogen sealed-beam headlights, vehicle rear and front structure, prevention of fire risks, foot controls, and public service vehicles. Not all ECE regulations have U.S. counterparts; this is also indicated.

Motor Vehicle Manufacturers Assoc. of the United States, Inc., Vehicle Safety Engineering and Standards Dept.
1976; 473p

Revised Sep 1976.

Availability: Corporate author

HS-024 787

RIDE QUALITY EVALUATION IN GROUND BASED VEHICLES: PASSENGER COMFORT MODELS FOR BUSES AND TRAINS

Experiments determined the effect of the passenger's environment on comfort in intracity buses and intercity trains. Data gathered included the following: roll, pitch, yaw, longitudinal acceleration, transverse acceleration, vertical acceleration, noise, and temperature. For bus passengers, comfort ratings correlated most strongly with roll rate and with vertical acceleration. For train passengers, noise and roll rate were the most important factors influencing comfort. Combination of data to make a composite model for ground-based vehicles showed that roll had the strongest correlation with comfort, and that noise and both vertical and lateral acceleration are moderately correlated with comfort. Models for airplanes, however, emphasize the components of vertical and transverse accelerations. Nevertheless, it should be possible to obtain general models of human reaction to motion independent of vehicle type.

by Larry G. Richards; Ira D. Jacobson; Richard W. Barber; Richard C. Pepler

DOT-TSC-1090

Publ: Ergonomics v21 n6 p463-72 (Jun 1978)

1978; 4refs

Presented in part at Psychonomic Society Annual Meeting (17th), St. Louis, 11-13 Nov 1976; and Transportation Res. Board 1977 Annual Meeting, Washington, D.C. Summaries in French and German.

Availability: See publication

HS-024 788

MOTORING EXPENDITURE SHORTLY BEFORE AND AFTER THE OIL CRISIS OF 1973/74

Family Expenditure Surveys of 1972, 1975, and 1976 by the Dept. of Employment provided information by which general changes in household expenditure were assessed, with particular reference to motoring expenses. Tables and graphs of family expenditure are presented to determine the effect of the sudden large increase in oil prices in 1974 (20-25% in real terms on 4-star gasoline). It was determined that there was a fall of 3-4% in private car travel between 1973 and 1974 instead of an expected rise of this amount. By 1975, total car travel was back to the 1973 level. A table is provided of average household incomes and expenditures (pounds/week). Graphs show expenses for purchase of motor vehicles and income, total expenditure on motoring and total income, and expenditure on motoring use and income. All of these graphs show a steady rise. Graphs of the proportion of "uncommitted" income spent on motor vehicle purchase and maintenance against "uncommitted" income indicate a steady decline after 10 pounds/week. A greater proportion was spent in 1972 on purchase of motor vehicles than in 1975 or 1976; otherwise the graphs for the three years are similar.

by George Charlesworth

Publ: Traffic Engineering and Control p463-5 (Oct 1978)

1978; 9refs

Availability: See publication

HS-024 789

FIVE TOUGH DISC BRAKE PROBLEMS AND HOW TO SOLVE THEM

Five problems are discussed which concern only disc brakes, and methods of identification and repair are presented. Low brake pedal not caused by a faulty master cylinder can be due to defective or misadjusted wheel bearings, or to a rotor which is bent or has excessive runout. Excessive pedal pressure needed to stop the vehicle can be caused by a malfunctioning brake booster, by a partial system failure in a dual brake system, or by worn or grease soaked brake pads. Other causes of high pedal effort are stuck or sluggish caliper pistons, or incorrect brake pad material. "Grabby" brakes have a number of causes, including incorrect or loose brake pads, grease or brake fluid on the pads, loose caliper or caliper mounting brackets, a sticking caliper piston, or a binding brake mechanism. A malfunctioning proportioning valve can cause the rear wheels to lock up too early. Other causes of "grabby" brakes are from conditions which cause a car to pull to one side: incorrect tire pressure, front end out of alignment, unmatched tires on the same axle, restricted brake tubes or hoses, defective or damaged brake shoes or lining, or loose suspension parts. Excessive drag in one front brake is caused by pistons sticking in caliper bore, making a car pull to one side when the brakes are not being applied. A pulsating brake pedal is caused by excessive variation on rotor thickness or excessive lateral runout in a rotor.

by John Samanich

Publ: Motor v150 n4 p43-5, 80 (Oct 1978)

1978

Availability: See publication

HS-024 790

GASKET GUIDE

Gaskets are described as sharing the common function of making a tight fit between two metal surfaces. Installation techniques for automobile gaskets are outlined for most satisfactory performance, with emphasis on preparing the surface, selecting the correct gasket, and fitting the gasket. Gasket surfaces for rocker cover, timing cover, and engine and transmission oil pans must be clean, flat, and smooth before the gasket is installed. Methods for testing surface smoothness are suggested. Fast drying and spray-on adhesives are recommended for gluing gaskets. Cylinder head gaskets are the most critical, requiring the most care in installation, including waiting for the engine to cool thoroughly. Head gasket failure can lead to an accumulation of rust and sludge in the cooling system, and any blockage around the coolant metering holes could result in a hot spot and recurring gasket failure. Different types of head gaskets are discussed, evolving from the sandwich type, through embossed steel gaskets, to the composition, or soft seal gasket. Problems involving intake manifold gaskets result from inadequate bolt loading and positioning. Precautions must be taken during installation to prevent blocking the coolant drains. Special gaskets are available for installing on cars shipped without exhaust manifold gaskets. Silicone formed-in-place liquid gaskets are a new development, being used on some new cars to form the rocker cover gaskets. Other applications include the pan, rocker, cover, intake manifold, water pump, thermostat case, transmission pan, timing cover, or differential cover. Silicone material should not be used on exhaust manifolds, cylinder heads, or between carburetor and intake manifold. Silicone

sealers are also used for repairing and filling in gaskets and to connect gasket joints, as well as for sealing windshields and keeping water out of tail lamp assemblies. A list of gasket suppliers is presented, and the relative merits of cork as a gasket material are discussed in a separate note.

by Bob Cerullo
 Publ: Motor v150 n4 p58-62, 64 (Oct 1978)
 1978
 Availability: See publication

HS-024 791

UTILIZATION OF ENERGY RESOURCES BY URBAN TRANSPORTATION SYSTEMS. AN INTEGRATED EVALUATION OF NEW FUEL AND VEHICLE TECHNOLOGIES FOR TRANSPORTATION

Future fuel and vehicle technologies are evaluated in terms of costs, efficiencies, transportation demand by vehicle class, energy demands by fuel type in competing sectors, and projections of raw resources used for fuel production. Variation in ratios of coproducts from several fuel conversion processes is included as a significant energy-planning option. The analysis is formulated quantitatively as a linear program optimization, with total economic cost of energy delivered to consumers as the objective function to be minimized. Petroleum (both domestic and imported) is the best choice for supplying energy for transportation. Shale syncrude could be a useful supplement, and methanol and electricity may have some limited uses. More work should be done on a mix of gasoline, distillate, and fuel oil. Distillate production should be increased for diesel use. Synthetic fuels, coal, biomass, and nuclear energy will probably be used for energy other than transportation energy. Coal may be gasified to provide a distillate fuel substitute, although this should not be the principal use for coal. The cost and energy deficiencies of distillate-maximized refining and diesel engine combustion encourage diesel use, but if distillate fuel is in short supply or if emissions standards eliminate diesel autos, advanced battery electric (lithium-sulfide, for instance) vehicles will be used. Conventional battery technology is noncompetitive, and gas turbine technology may not be. Enforcement of 1978 auto emissions standards would decrease fuel economy of all spark-ignition configurations and would eliminate the diesel. Compliance with 1985 fuel economy standards would reduce the percentage of large autos produced.

by Larry M. Sweet
 Princeton Univ., Dept. of Aerospace and Mechanical Sciences,
 Princeton, N.J. 08540
 GM-TS-66109
 Rept. No. AMS-TR-1322; 1977; 220p 170refs
 Availability: Corporate author

HS-024 792

MOTOR VEHICLE TRAFFIC ACCIDENTS 1977

Statistics are presented covering motor vehicle traffic accidents in Texas during 1977, when traffic accident deaths reached a record high of 3698, an increase of 14% over the previous year. Vehicle miles traveled (VMT) in 1977 also reached a record high (96.998 billion), an increase of 6% over 1976. The resulting death rate was 3.8 deaths per 100 million VMT, next to the lowest death rate ever recorded in Texas. The number of driving while intoxicated (DWI) drivers in-

volved in fatal motor vehicle traffic accidents increased 35% over the year. Persons killed in motor vehicle traffic accidents involving DWI drivers increased 27%. Motorcycle deaths in 1977 totaled 270 compared with 186 in 1976, an increase of 45.2%. Almost the entire increase resulted from deaths of motorcycle riders not wearing helmets. Deaths in that category rose from 12 in 1976 to 89 in 1977, a 641.7% increase. Detailed data are presented on motor vehicle registration and licensed drivers; on deaths and casualties; on where, when and how accidents happen, including data on DWI as a contributing factor; and on age and license status of drivers in accidents and on vehicles involved.

Texas Dept. of Public Safety
 1977; 48p
 Availability: Corporate author

HS-024 793

HIGHWAY SAFETY, TRAFFIC RECORDS, AND LAW ENFORCEMENT

Seven studies (three abridgements) on highway safety, traffic records, and law enforcement cover roadside hazards for projecting fatal crash sites, roadway environment subsystem of the highway traffic records system, evaluation of alcoholism treatment programs for drinking drivers, economic analysis of alcohol safety countermeasures, administrative adjudication of driving-while-intoxicated offenses, evaluation of the halo effect in speed detection and enforcement, and an analysis of the relation of accidents and the 88-kmh (55-mph) speed limit on Arizona highways.

by Susan L. Lang, ed.
 Transportation Res. Board, 2101 Constitution Ave., N.W.,
 Washington, D.C. 20418
 Rept. No. TRR-609; PB-272 801; 1976; 40p
 Availability: TRB \$2.00

HS-024 794

ELECTRONICS RECORD TRUCK ECONOMY DATA

Acquiring, recording, and processing real-world vehicular operating and environmental data are important in developing techniques to reduce fuel consumption and other operating costs. On-board microprocessors yield immediate knowledge of certain data elements, and storage or compacting of others, without operator bias. Use of Rockwell International's Tripmaster on-board instrumentation system in obtaining operating and environmental data from assorted Class 6 and 8 trucks and tractors should provide guidance for obtaining future operational economies. The DOT/SAE Truck and Bus Fuel Economy Measurement Study involves testing subsystems, components, aerodynamics and rolling resistance during normal revenue-producing operation. Comparison is made between a standard and a fuel-efficient version of each type of vehicle. The Tripmaster system consists of an on-board instrumentation computer, sensor set, and data monitoring display unit. Each system has been programmed to gather the required information, preprocess, select, and compact the data, and store them for later retrieval and analysis. Problems in data acquisition include harsh environment, performance of all on-board microcomputer functions without human intervention, and requirements for being self-contained, easily installed, unobtrusive, and for drawing minimal battery power. The system must retain stored data over extended time periods, must de-

tect system malfunction, and must be capable of transferring data to an automatic off-board computer for analysis, while informing the vehicle operator of the system's and vehicle's condition. The parameters to be monitored include: engine rpm, oil and coolant temperature, and load factor; transmission oil temperature and clutch activation; fuel consumption, temperature, and fuel remaining; such vehicle options as PS pump pressure, air conditioning, air compressor, and radiator fan; environmental factors of ambient temperature, barometric pressure, road grade, and wind direction; real time and date; electrical components such as battery voltage, alternator load, and ignition; and vehicle speed/distance, brake application, axle temperature, and city vs highway operation. Interrelationships between fuel economy, vehicle performance, and various external factors are analyzed using the in-service data. The instrumented trucks are operated nationwide, obtaining data covering a broad spectrum of terrain, temperature, road conditions, and on both highway and city operation.

Publ: Automotive Engineering v86 n12 p24-9 (Dec 1978)
1978

Based on SAE-780959, "Data Acquisition System for Vehicle Fuel Economy Measurement," by Morton S. Balban and H. O. Williams, and on SAE-780960, "On-Board Processing for Truck/Bus Fuel Economy and Operational Data Acquisition," by Ruth A. Hunter, Jeanne M. Baker, and John E. Juhasz. Availability: See publication

HS-024 795

LIGHT TRUCK FUEL ECONOMY, CHALLENGE FOR THE 1980's

A study by the Ford Motor Co. addresses design approaches for fuel-efficient light trucks: weight reduction, downsized frontal area, aerodynamic improvements, powerplant sizing, etc. Light trucks are generally considered "weight efficient" since they generally carry payloads from 25% to 100% greater than their base curb weights; under these conditions, weight reduction is difficult. Engine downsizing via high strength steels and use of plastics is studied for the 1980's, as is use of graphite-fiber reinforced components. Performance and emission requirements and technical problems are limiting factors. The use of aluminum is likely to increase, albeit at a cost penalty. The stages of fuel economy improvements include determination of minimum power requirements for acceleration and cruising performance; reduction of aerodynamic drag and frontal area; reduction of road load power consumption (tires, weight and other powertrain losses); selection of the smallest displacement engine of acceptable performance within durability, emissions, engineering, manufacturing and other constraints; reduction of engine operating rpm to lowest possible levels; optimization of automatic transmissions by adding torque converters and extending ratio range capability; tailoring transmission size to engine power output; and consideration of alternate technology. Technology for improving manual transmissions to some degree is currently available. Major fuel losses in a typical automatic transmission occur in the torque converter, hydraulic oil pumps, and hydrodynamic friction between clutch plate, gears, and bands. Fuel economy is also significantly affected by such vehicle accessories as cooling fans, alternators, air pumps, power steering, and air conditioning compressors, and by belt drive flex losses. In the 1980's, further attention will be paid to reducing parasitic power loss via variable-speed accessory drives or other devices to reduce accessory power consumption at higher engine rpm. Among alternative powerplants to be considered for light trucks in the 1980's are diesel engines, Ford PROCO engines, and tur-

bocharging. Although emission regulations limit fuel economy in conventional engines, downsizing the gasoline engine may provide performance equal to or better than the diesel at similar fuel consumption, since diesels have the cost penalty of fuel injection, fuel pumps, and physical mass and strength requirements. Ford considers that the PROCO engine should provide all the advantages of both diesel and gasoline engines. The PROCO is a modified stratified charge gasoline piston engine using direct cylinder fuel injection, a combustion chamber in the piston, air throttling, exhaust gas recirculation, and oxidation catalysts. Turbocharging is an ideal but costly means of maintaining power with reduced displacement.

Publ: Automotive Engineering v86 n12 p30-6 (Dec 1978)
1978

Based on SAE-781063, "Light Truck Fuel Economy by Design Efficiency," by David J. Bickerstaff. Availability: See publication

HS-024 796

FOUR-BY-FOURS DESIGNED FOR FUEL SAVINGS [FOUR-WHEEL-DRIVE VEHICLES]

Four-wheel-drive vehicles, used as open utility vehicles, pickup trucks or vans, are capable of transporting passengers and cargo over highways and off-road terrain. Conventional and full-time four-wheel-drive systems are described, including the effect of Federal fuel economy regulations on the future of such systems. The Environmental Protection Agency fuel economy and emissions dynamometer tests are outlined, and methods considered for reducing fuel consumption, including inertia weight reduction through substitution of lightweight material, decrease in weight of driveline components, frame structures and suspension systems, and utilization of a different front axle system (i.e. independent front suspension). Minimization of frontal areas also helps to increase fuel economy, as does maximization of drive system efficiency by reduction of the number and weight of rotating components and of the number of gear meshes. Fuel economy can also be increased by optimized design of front axle gear set, correlation of lubricants with intended use, and reduction of torsional windup in drivetrain components. Specifications for Dana Corp.'s prototype fuel-efficient sport/utility, four-wheel-drive vehicle, the LW, are presented. The LW was designed to improve fuel economy in a current production vehicle without sacrificing performance, passenger space, or cargo carrying ability. A set of specifications is enumerated for redesigning the Jeep CJ-5 to suit the LW configuration.

Publ: Automotive Engineering v86 n12 p38-45 (Dec 1978)
1978

Based on SAE-781061, "Fuel Efficient Four-by-Four Vehicles of the Eighties," by L. W. Spearman and John Raffa. Availability: See publication

HS-024 797

EPA [ENVIRONMENTAL PROTECTION AGENCY] MILEAGE ESTIMATES: HOW REALISTIC?

Environmental Protection Agency (EPA) mileage estimates were studied by SAE students at California State Univ., Chico, by running fuel consumption tests on a 1978 Chevrolet Monte Carlo (automatic transmission, 5.0-L, V-8 engine), a 1977 Mercury Monarch (automatic transmission, 5.0-L, V-8 engine), and a 1978 Ford Fiesta (standard 4-speed transmission).

The Monte Carlo and Fiesta were equipped to meet California emissions standards and the Monarch to meet Federal standards. The vehicles were tested under actual driving conditions: stop-and-go city driving and steady highway speeds under average conditions of temperature (17.5-20.5 degrees C), barometric pressure (775 mm), and relative humidity (near 55%), using unleaded fuel. Variables tested included driver differences for city fuel consumption, and constant speed highway fuel consumption under one set of conditions. A fifth wheel was used in the constant speed runs. Prior to testing, the vehicles were checked for correct ignition timing and operational emission control devices, the only modification being temporary installation of 3-way fuel control valves. Test results show that the EPA estimates might be the maximum obtainable at a constant 55 mph speed, the variation in city fuel consumption from EPA estimates depending largely on individual driver's habits. Driving the Monarch with windows open at 50 mph decreased fuel economy from 22.96 mpg to 22.54 mpg. Air conditioning set for maximum cooling reduced fuel economy 10% at 50 mph with an ambient temperature of 20.5 C. Reduction of tire pressure on the Monte Carlo from 28 psi to 20 psi reduced fuel economy from 21.33 mpg to 20.53 mpg at 50 mph.

Publ: Automotive Engineering v86 n12 p46-7 (Dec 1978) 1978

Based on SAE-780866, "EPA MPG: How Realistic?" by Robert W. Donoho.

Availability: See publication

HS-024 798

WILL MOBILE EQUIPMENT USE FIRE-RESISTANT HYDRAULIC FLUIDS?

Four types of fire resistant hydraulic fluids exist (water-base, phosphate ester, invert emulsion, and water glycol), but their use in internationally used mobile equipment requires consideration of the effect of governmental regulations, minimization of possible product liability, and control of capital costs. Definition of fire resistance must be agreed upon, as well as the particulars of fire resistance testing, with improved worldwide standards. The current water-based hydraulic fluids require redesigning of high-temperature, high-pressure hydraulic systems, now designed for use with mineral oils. Water-based fluids show poorer lubricity than petroleum-based hydraulic fluids. Phosphate ester fluids are self-extinguishing rather than non-flammable; they have excellent lubricity, equivalent to mineral oil, but are presently 5-6 times as costly. Invert emulsions are water-in-oil compositions, consisting of a maximum of 60% combustible material. Invert emulsions have been used in British underground mining operations for over 15 years. Water glycol fluids began to be actively used in the early 1950's in die casting and other metal producing shops. This type of fluid has been used with some success in sealed systems, which prevent loss by evaporation. Water glycol mixtures, having high specific heat, are capable of extracting more heat than petroleum-based fluids for a given circulating volume. These fluids have good stability in closed loops and have less viscosity differences over a wide temperature range than do mineral oils, as well as less tendency to leak. They presently cost 2-3 times as much as mineral oils. Based on present technology, water glycol and phosphate ester fluids would be expected to be most appealing to the mobile equip-

ment industry, with cost/performance ratios offsetting initial higher cost.

Publ: Automotive Engineering v86 n12 p48-50 (Dec 1978) 1978

Based on a panel discussion of "Fire Resistant Fluids for Mobile Equipment" at SAE Off-Highway Vehicle Meeting. Availability: See publication

HS-024 799

PARAMETRIC TOOL EVALUATES AUTO EFFICIENCY [TOTAL FUEL CONSUMPTION/INERTIA WEIGHT]

The use of a parameter, total fuel consumption divided by inertia (test) weight (TFC/IW), is explained as a simple means comparing the efficiency of individual cars or fleets. For convenience, the units chosen are gallons per 100 miles per 100 lbs. It was observed several years ago that the industry sales weighted TFC/IW was approximately constant for all inertia weight classes and the range was about the same regardless of inertia weight. It is important to remember that automakers match engine displacement to inertia weight. Environmental Protection Agency 1978 vehicle test data are sorted by engine and inertia weight for each of the four major subfleets, for the United States and California [emissions regulations], and diesel and gasoline passenger cars and trucks. Means, standard deviations, and maximum and minimum values are given for: urban, highway, and total (combined) fuel economy, inertia weight, TFC/IW, engine cubic inch displacement, SAE engine horsepower rating, dynamometer load horsepower, axle ratio, N/V, and urban values of hydrocarbons, carbon monoxide, and nitrogen oxide emissions. The effect of weight reduction on fuel consumption is dependent on vehicle weight, technology level, and test procedure. The TFC/IW factor is the measure of a vehicle's technology level. Calculations determining this factor indicate that weight reduction with downsizing is more effective than without downsizing, and that much less weight reduction is necessary to gain a mile per gallon fuel economy increase for a small vehicle than a large one.

Publ: Automotive Engineering v86 n12 p52-7 (Dec 1978) 1978

Based on SAE-780937, "TFC/IW," by Doran K. Samples and Richard C. Wiquist.

Availability: See publication

HS-024 800

VORTEX GENERATOR EXTENDS LEAN LIMIT

Flame speed and lean extinction limit of a single-cylinder four-stroke Renault spark-ignition engine were experimentally extended by installation of a "vortex generator" in the intake. This device, consisting of a nest of delta wings joined at the apexes, was placed in the inlet port of the engine with the baseplate trapped between the head and the inlet pipe and the apex directed toward the head and carburetor. Results suggest that the conventional throttle could be replaced by a variable geometry vortex generator, with blockage ratio being variable.

Aug 31, 1979

HS-024 804

with speed and load. The effect of the vortex generator is particularly beneficial in the lean mixture range.

Publ: Automotive Engineering v86 n12 p62-4 (Dec 1978)
1978

Based on SAE-780964, "Lean Mixture Running of the Spark Ignition Engine by the Generation of a Vortex System Within the Intake," by G. G. Lucas, M. Brunt, and S. Petrovic.

Availability: See publication

HS-024 801

BODY PANEL DESIGN CAN PREVENT CORROSION

Among the factors contributing to increased automobile body corrosion are increased use of road salt and hygroscopic calcium chloride, marginal vehicle cleaning and maintenance, and reduced steel gauge and corrosion tolerance in fuel-efficient cars. Dips, sprays, and sacrificial coatings are among the methods for preventing contact between metal and hostile environmental elements. Recent increase in the use of cathodic electrocoat dip primers has necessitated large openings for electric current access to allow proper coating of hidden areas. Factors in design are presented to prevent corrosion of hoods, fenders, doors, quarter panels, wheelhouse assemblies, deck lid assemblies, rear door lock pillars, rocker panels and floor pans.

Publ: Automotive Engineering v86 n12 p67-73 (Dec 1978)
1978

Based on SAE-780916, "Designing Body Panels for Corrosion Prevention," by Arthur W. Bryant.

Availability: See publication

HS-024 802

SYNTHETIC OILS EXTEND DRAIN INTERVALS

Studies conducted primarily with domestic vehicles and typical U.S. service illustrate the excellent overall performance of a synthesized passenger car engine oil during greatly extended drain intervals. Data were obtained on engine cleanliness and wear, and lubricant stability under different types of service, including heavy duty taxicab and police car operations. Information was also available from a high mileage test using the Environmental Protection Agency (EPA) durability cycle. Current API SE quality engines oils provide good engine cleanliness and wear protection at normal drain intervals of 12,000-16,000 km, but with extended drain intervals, problems arise from excessive oil thickening, increased engine sludge and/or varnish deposits, resulting in engine wear. A synthesized oil known as Syn 1, containing additives in amounts and ratios quite different from those in mineral oils, underwent field tests, including a second high-temperature parkway police test, tests in employee cars typifying normal consumer driving conditions and care, a second independent laboratory fleet test (EPA durability cycle), and a national automobile club cross-country proof-of-performance program. Filters were generally changed at drain times. In the parkway police test, Syn 1 provided improved varnish protection over mineral oil drained at shorter intervals. Tests in an urban taxicab fleet showed that Syn 1 provided engine cleanliness superior to that provided by a mineral oil after three times the mineral oil drain period. Tests on Syn 1 in employee cars after 1-2 1/2 years of no-drain service showed that the used oil was suitable for further use except for a few cases of external contamination (silicon). In no case was the drain sample unsatisfactory in oxidation stability or from loss of alkalinity. In the national automobile club

test, oil consumption of Syn 1 over 40,000 km was 0.166 L/1000 km, compared to 0.219 L/1000 km consumption of a reference oil.

Publ: Automotive Engineering v86 n12 p74-7 (Dec 1978)
1978

Based on SAE-780951, "Synthesized Lubricants Provide Exceptional Extended Drain Passenger Car Performance," by D. B. Barton, J. A. Murphy, and K. W. Gardner.

Availability: See publication

HS-024 803

GUIDE TO MOTORCYCLING

Information needed to operate a motorcycle safely in traffic is presented. Topics covered include preparing to ride (proper clothing and equipment check), control for safety, conspicuousness, looking for trouble (using eyes, head and mirrors), keeping your distance, handling dangerous surfaces, riding at night, emergencies, and carrying passengers and cargo. Further sections deal with group riding, being in shape to drive, motorcycle care, and a sample test for operator licensing.

American Automobile Assoc., Traffic Engineering and Safety Dept., Falls Church, Va.

Rept. No. AAA-3304; 1978; 38p

Prepared by National Public Services Res. Inst., in cooperation with Motorcycle Safety Foundation, under contract to National Hwy. Traffic Safety Administration.

Availability: Corporate author

HS-024 804

ADOLESCENT PROBLEM DRINKING: PSYCHOSOCIAL CORRELATES IN A NATIONAL SAMPLE STUDY

A profile, developed using multivariate analysis of psychosocial data from a 1974 national survey of adolescent drinking by the Res. Triangle Inst. of North Carolina indicated that problem drinking was part of a general adaptation to self, others, and circumstances, rather than an isolated activity. All the adolescents in grades seven through twelve in 48 states and the District of Columbia were sampled through a 35-page self-administered questionnaire. Only selected measures from problem behavior theory were included. The pattern of characteristics that differentiates problem and nonproblem drinkers is conceptualized as a pattern of greater proneness to problem behavior. In the personality system, this means greater instigation to problem behavior (greater value on independence, less value on academic achievement) and fewer personal controls against problem behavior (more tolerance of transgression, less religiosity and greater importance to the positive functions of drinking). In the perceived environmental system, the problem drinkers' proneness to problem behavior was manifested by less compatibility between their parents' and friends' norms and expectations, and also by greater acknowledged influence from friends than from parents. In the behavior system, the problem drinkers' proneness to problem behavior was revealed by less involvement in or commitment to conventional activities (in church or school) and more involvement with protodelinquent activities (lying, stealing and aggression). The survey results indicate that adolescent problem drinking is part of a syndrome and that attempts at al-

HS-024 805

cohol-specific remedies for problem drinking will not be successful.

by John E. Donovan; Richard Jessor
 NIAAA-ADM-281-75-0028
 Publ: Journal of Studies on Alcohol v39 n9 p1506-24 (1978)
 Rept. No. Institute-of-Behavioral-Studies-Pub-171; 1978; 23refs
 Availability: See publication

HS-024 805

CRYING WOLF [DEFENSE OF GOVERNMENT REGULATIONS]

The administrator of the National Hwy. Traffic Safety Administration defends governmental health and safety regulations against criticism by private corporations. Although these corporations welcome government subsidy, lending, guarantee, insurance, and defense against cartels, they resist the governmental role as defender of the consumer. The auto industry does not oppose the principle of government safety regulation, but it still fights proposals like passive restraints, and resists safety recalls. Foreign vehicles have shown up the domestic car makers; Volvo and Saab rank one and two on the California Air Resources Board's list of least polluting cars. Most industry comments ignore the benefits of regulations even when they do not affect the costs. A supporting index for the necessity of automobile safety regulations may be found in the annual recall of about five million vehicles since 1966 for defects that pose safety hazards. The need for regulation for fuel economy is also evident. Motor vehicles account for about 40% of U.S. petroleum consumption, much of it from abroad. According to data supplied by the auto industry, the average cost to consumers of safety features in a 1978 model automobile was about \$250, 5% of the total vehicle price. It is estimated that safety regulations have saved about 28,000 lives from 1966 to 1974. National opinion surveys show that the American people support government health and safety standards. Even without public support, the benefits of these regulations could still outweigh the costs.

by Joan Claybrook
 National Hwy. Traffic Safety Administration, Washington, D.C. 20590
 Publ: AEI Journal On Government and Society, Regulation p14-6 (Nov/Dec 1978)
 1978
 At head of title: Viewpoint.
 Availability: See publication

HS-024 806

BICYCLE-SAFETY EDUCATION. FACTS AND ISSUES

A compendium of current information that may prove useful to persons engaged in the development, evaluation, or use of bicycle-safety education programs and materials, mainly on the local level, is presented. It is not intended to be a comprehensive review of the literature, but rather an attempt to identify the topics and issues most relevant to bicycle-safety education, citing the fewest number of necessary references. Care has been taken to identify important topics for which little information is available. A brief description of what is known about the size and composition of the U.S. population of bicycles and bicycle users provides data on bicycle sales and bicycles in use; the size, age distribution, and sex distribution of the bicycle user population; and the purpose and

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frequency with which bicyclists ride. What is known and what is not known about the magnitude of the bicycle-accident problem are described; bicycle/motor-vehicle accidents and all other kinds of bicycle-related accidents are discussed separately; the incidence, consequences, and costs are estimated (nationwide), together with their probable accuracy. Detailed data from a recent study of bicycle/motor-vehicle accidents are presented on the characteristics of the accident-involved operators, the type and condition of the accident vehicles, the type of trip, and the type of accident location. In addition, the accident-generation process is described for 36 different types of bicycle/motor-vehicle accidents. The accident location and the pre-crash actions of both vehicles are illustrated and discussed for the 25 most frequently occurring types of accidents, and educational countermeasures are identified for each accident type. A detailed discussion of educational objectives is presented, devoted mainly to the education of bicyclists. A large number of specific educational objectives are recommended, with their bases described. There follows a summary of the problems and issues that must be resolved before an effective educational program can be developed and implemented.

by Kenneth D. Cross
 Anacapa Sciences, Inc., Santa Barbara, Calif.
 1978; 168p 40refs
 Availability: AAA Foundation for Traffic Safety, 8111 Gatehouse Rd., Falls Church, Va. 22042

HS-024 807

STATUS OF DEVELOPMENT OF OBJECTIVE TEST PROCEDURES FOR DRIVING BEHAVIOR. CONFERENCE OF THE INSTITUTE FOR TRAFFIC SAFETY RESEARCH, RHINELAND INDUSTRIAL MONITORING UNION, VEHICLE BRANCH, 1 DECEMBER 1977, COLOGNE-POLL (ENTWICKLUNGSSTAND DER OBJEKTIVEN TESTVERFAHREN FUR DAS FAHRVERHALTEN. KOLLOQUIUM DES INSTITUTS FUR SICHERHEITSFORSCHUNG IM STRASSENVERKEHR, TECHNISCHEM UBERWACHUNGS-VEREIN REINLAND E.V., 1. DEZEMBER 1977, KOLN-POLL)

A compilation is presented of seven papers (and discussions thereof) on the state of the art of the driver/motor vehicle/environment system with respect to vehicle handling evaluation criteria. Objective and reproducible test procedures and criteria, leading to international standardization, must be developed, in order to improve traffic safety. The papers cover such topics as evaluation criteria for the driving behavior of passenger cars, correlation between vehicle tests and subjective evaluation, test procedures in designing driving behavior, test procedures for variable steering behavior and for braking in a turn, a test procedure for the evaluation of the lateral dynamics of commercial vehicle combinations, and driving behavior of automobile-mobile home trailer modules.

Technischen Überwachungs-Verein Rheinland, Institut für Sicherheitsforschung im Strassenverkehr, TÜV Rheinland e.V., Postfach 10 17 50, 5000 Köln 1, West Germany
 1978; 395p 82refs
 Translated from German (original 239p; translation 156p).
 "Active Driving Safety" Colloquium Series (Kolloquiumsreihe "Aktive Fahrsicherheit"). Includes HS-024 808--HS-024 814.
 Availability: Corporate author

HS-024 808

EVALUATIONAL CRITERIA FOR THE DRIVING BEHAVIOR OF PASSENGER CARS. AN OVERVIEW (BEWERTUNGSKRITERIEN ZUM FAHRVERHALTEN VON PERSONENKRAFTWAGEN. EINE UBERSICHT)

The present status of evaluation methodology for driving behavior (the total complex of driver actions and subsequent vehicle reactions, including the effects of the driving environment) is discussed. The various test procedures and evaluation criteria for driving behavior are reviewed. It is shown that there are an infinite number of possible driving situations and evaluation options. Subjective or objective evaluation values in open-loop or closed-loop tests of actual driving conditions or simulations are seldom applicable to more than a single test procedure. It is particularly difficult to make comparisons among various studies of driving behavior in which test procedures are carried out with different input values and parameters. Much remains to be done with regard to the standardization of test procedures so that results of driving behavior studies can be compared.

by R. Ronitz
Adam Opel A.G., Russelsheim, Germany
Publ: HS-024 807 "Status of Development of Objective Test Procedures for Driving Behavior," (pub. in German in Cologne), 1978 p4-19
1978; 5refs
Conference held in Cologne-Poll, 1 Dec 1977. Translated from German (original 22p; translation 16p).
Availability: In HS-024 807

HS-024 809

CORRELATION BETWEEN VEHICLE TESTS AND SUBJECTIVE EVALUATION

To relate subjective evaluation of motor vehicle handling qualities to vehicle measurements, it is necessary to correlate subjective ratings with either vehicle response parameters or driver-vehicle performance. The major response parameters influencing subjective evaluation are response time, steering gain, and natural yaw frequency. Subjective rating improves with an increase of gain and response time up to a certain point at which the best rating is reached. Further change of these parameters beyond that point results in worsening of subjective rating. Correlation between measurements and subjective evaluation conducted by different investigators has shown a wide variation. It has been found that selection of test vehicles is the major factor affecting correlation. To achieve a good correlation, it is necessary to select a group of vehicles with distinctly different values of each vehicle response parameter. The difference between the values of response parameters should be large enough to be reliably perceived by all evaluators. If correlation is restricted to a single response parameter, the differences between the values of other response parameters among test vehicles should be kept to a minimum. In multiple correlation when two or more response parameters are employed, the range of values of each parameter should be balanced evenly in order to avoid biases. An improper balancing tends to produce a disproportionately large effect of one parameter and a negligible effect of another. Correlation also is influenced by selection of test criteria. It has been shown that some parameters expressing response time show good correlation; however, others show

no correlation at all. Careful selection of evaluators and test procedures also is essential for achieving a good correlation.

by W. Bergman
Ford Motor Co., Dearborn, Mich.
Publ: HS-024 807 "Status of Development of Objective Test Procedures for Driving Behavior," (pub. in German in Cologne), 1978 p20-48
1978; 25refs
Conference held in Cologne-Poll, 1 Dec 1977. Original document in English (51p).
Availability: In HS-024 807

HS-024 810

TEST PROCEDURES IN DESIGNING DRIVING BEHAVIOR (MESSVERFAHREN BEI DER AUSLEGUNG DES FAHRVERHALTENS)

Test-stand procedures for both continuous and variable driving conditions which have proven to be suitable methods for obtaining data on vehicle handling to support prototype vehicle development are discussed. Axle test stands equipped with the most current electronic and computer technology measure vehicle kinematics, inclination, axle elasticity, suspension, and steering elasticity. The results of the test-stand studies must be extrapolated to the actual driving situation; in practice, actual driving tests to measure vehicle behavior mainly are driving in a circle (steady-state) and load shift while driving in a circle (transient). Test values of importance include transverse acceleration, longitudinal acceleration, roll angle, angle of inclination, yaw angle, yaw angle velocity, and steering slip. Vehicle dynamics data recorded electronically during actual driving tests include driving in a circle (steady-state) and load shift while driving in a circle (braking in a turn, effective steering transfer, crosswind, lift, and frequency response).

by A. Zomotor
Daimler-Benz A.G., Stuttgart, Germany
Publ: HS-024 807, "Status of Development of Objective Test Procedures for Driving Behavior," (pub. in German in Cologne), 1978 p49-70
1978; 5refs
Conference held in Cologne-Poll, 1 Dec 1977. Translated from German (original 38p; translation 22p).
Availability: In HS-024 807

HS-024 811

TEST PROCEDURES FOR TRANSIENT STEERING BEHAVIOR (TESTVERFAHREN FUR DAS INSTATIONARE LENKVERHALTEN)

An analysis and critical survey of test procedures used to evaluate motor vehicle behavior in response to driver steering input are provided. Test procedures are discussed in terms of open-loop and closed-loop systems. Evaluation criteria derived from subjective and objective measurements of vehicle behavior under transient conditions are discussed. It is concluded that the most important open-loop tests for studying variable steering behavior are the steering wheel correction test with measurement of the step functions at various constant driving speeds and continuous low accelerations, and "weaving" tests with smooth steering changes of various amplitudes at different constant speeds measuring the frequency responses (amplitude, phase). Important test values include steering wheel angle, steering moment, longitudinal speed, transverse speed (pitch angle), yaw velocity, transverse ac-

celeration, and possibly the roll angle. The evaluation of results from these tests supplies a number of characteristic values appropriate for the characterization of transient steering behavior under normal traction conditions for fixed-control situations. An "intensification factor" expresses the relationship between yaw velocity or transverse acceleration and steering wheel angle in continuous operation. The vehicle dynamics can be characterized through the degree of phase shift between driver input (steering wheel angle) and vehicle response (yaw velocity or transverse acceleration). However, opinions still vary on the definition and method of determination of phase shift or time lag. The phase shift provides information on the speed of the vehicle response to driver input. The damping of the vehicle response is another frequently used value. The relationship between steering moment and acceleration is an additional intensification factor for evaluation. Further research is needed to establish boundary situations for test values.

by E. Bisimis

Technischen Universität Braunschweig, Germany

Publ: HS-024 807 "Status of Development of Objective Test Procedures for Driving Behavior," (pub. in German in Cologne), 1978 p71-87

1978; 19refs

Conference held in Cologne-Poll, 1 Dec 1977. Translated from German (original 24p; translation 17p).

Availability: In HS-024 807

HS-024 812

TEST PROCEDURES FOR BRAKING IN A TURN (TESTVERFAHREN FÜR DAS BREMSSEN IN DER KURVE)

Driving tests were conducted to evaluate a test procedure and to determine evaluation criteria for braking-in-a-turn studies of vehicle driving behavior. Three braking force distributions were utilized: production status, rear axle overbraked, and front axle overbraked. It is concluded that the one-second values of pitch angle, yaw angle velocity, and transverse acceleration as a function of deceleration at the time of driver reaction are better suited for describing variance in vehicle behavior than the lateral deviation from an ideal circle and the yaw angle deviation at vehicle standstill as a function of braking path. Differences in behavior of individual vehicle adaptations are greater the greater the turn radius, the greater the initial transverse acceleration, and the lower the traction of the road surface. Two criteria must be used to evaluate vehicle driving behavior during braking in a turn as a function of the deceleration and braking path; they are stability and steerability. Stability is indicated by test values for rotation around the vertical axis such as one-second values for pitch angle and yaw angle velocity or angle deviation in the final position. Steerability is indicated by test values for maintenance of course such as transverse acceleration one second after initiation of braking or lateral deviation in the final position.

by K. Rompe

Technischen Überwachungs-Verein Rheinland, Institut für Sicherheitsforschung im Straßenverkehr, TÜV Rheinland e.V., Postfach 10 17 50, 5000 Köln 1, West Germany

Publ: HS-024 807 "Status of Development of Objective Test Procedures for Driving Behavior," (pub. in German in Cologne), 1978 p88-107

1978; 12refs

Conference held in Cologne-Poll, 1 Dec 1977. Translated from German (original 27p; translation 20p). Research sponsored by

Federal Ministry of Traffic, and Federal Traffic Inst., Germany.

Availability: In HS-024 807

HS-024 813

A TEST PROCEDURE FOR THE EVALUATION OF THE LATERAL DYNAMICS OF COMMERCIAL VEHICLE COMBINATIONS

A test procedure to evaluate the lateral dynamic stability of heavy commercial-vehicle combinations has been developed, and requirements necessary to pass the performance test have been determined. A double-lane change was selected as the primary test maneuver for evaluating vehicle performance, and a computer simulation program was developed for testing. Full-scale tests have been conducted in order to evaluate the proposed test method and to validate the simulation program. As complementary tests, a steady-state dynamic off-tracking test, and a static overturning test have been developed. The effects of lateral sloshing on the overturning risk of partly-loaded tanker trucks have also been studied. Currently, none of the test procedures proposed to the Swedish Dept. of Transportation have been included in Swedish regulations for commercial trucks, but the double-lane-change computer test has been used unofficially by the approval authorities.

by Olle Nordstrom

National Road and Traffic Res. Inst., Fack S-581 01, Linköping, Sweden

Publ: HS-024 807 "Status of Development of Objective Test Procedures for Driving Behavior," (pub. in German in Cologne), 1978 p108-23

1978; 7refs (8refs in original)

Conference held in Cologne-Poll, 1 Dec 1977. Original document in English (26p). Research sponsored by Swedish Dept. of Transportation.

Availability: In HS-024 807

HS-024 814

DRIVING BEHAVIOR OF AUTOMOBILE-MOBILE HOME TRAILER UNITS (FAHRVERHALTEN VON WOHNANHÄNGERZUGEN)

Results of tests carried out for the Federal Traffic Inst. (Germany) and studies by various researchers on the driving behavior of automobile-mobile home trailer combinations are reviewed and evaluated. Based on the available information, the automobile-trailer unit has poorer braking and driving behavior than an individual automobile. In order to test driving behavior of the combinations, the following four procedures are deemed necessary: coming to a complete stop when driving in a straight line, braking in a turn, sudden turning of the steering wheel, and pulse-type turning of the steering wheel. It is concluded that the weight ratio of towing vehicle to trailer weight is not sufficient as a single criterion to measure the trailer load. In the case of the car, the overhang of the coupling can have a decisive effect on the driving behavior of the unit. In the case of the trailer, measures to decrease the yaw inertial momentum and to lengthen the hitch are the most important measures for improving driving behavior. The proper air pressure in all tires can make a significant contribution to safe driving in an existing unit. In order to make an overall evaluation of the driving behavior of mobile home

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trailers, additional testing is necessary in order to define the effect of towing-vehicle parameters.

by K. Burow
Technischen Überwachungs-Verein Rheinland, Institut für Sicherheitsforschung im Strassenverkehr, TÜV Rheinland e.V., Postfach 10 17 50, 5000 Köln 1, West Germany
Publ: HS-024 807 "Status of Development of Objective Test Procedures for Driving Behavior," (pub. in German in Cologne), 1978 p124-42
1978; 6refs
Conference held in Cologne-Poll, 1 Dec 1977. Translated from German (original 26p; translation 19p).
Availability: In HS-024 807

HS-024 815

LAMP EXAMINATION FOR ON OR OFF IN TRAFFIC ACCIDENTS. 2ND ED.

This manual provides the information needed by an accident investigator to determine, if possible, whether motor vehicle lamps were on or off at the time the vehicle was involved in an accident. The lamps may be headlights at night or signal lights by day or night. Information is presented in the following sections: circumstances warranting lamp examination, normal lamps, lamp abnormalities resulting from collision, special considerations, examining lamps and testing circuits, handling and storing lamps, lamps commonly used on motor vehicles, and references and acknowledgements. The manual contains many illustrations and photographs.

by J. Stannard Baker; Thomas Lindquist
Rept. No. PN-82; 1977; 39p 17refs
Advanced Accident Investigation Series.
Availability: Northwestern Univ., Traffic Inst., 405 Church St., Evanston, Ill. 60204

HS-024 816

THE DYNAMIC RESPONSE OF A SINGLE WHEEL SUSPENSION TO COMPUTER GENERATED ROAD PROFILES

A method of computing road profiles of various roughness by filtering a random binary sequence is developed; the validity of a simulated profile is established by comparing the generated profile characteristics with the power spectral density of measured profiles and also by making comparison with the specification for construction of highways. A single-wheel, loaded and unloaded, commercial vehicle model is used to examine the dynamic wheel loads generated by types of road which compare broadly with a motorway profile, a profile twice as smooth as a motorway, a Class A road, and a Class B road (British classification). The simulation results show that over the motorway profile, at vehicle speeds of 64 kph and 96 kph, peak impact factors of 1.29 and 1.40, respectively, were generated in an unloaded model suspension, the values reduced to 1.16 and 1.22, respectively, over a profile twice as smooth. In general, an unloaded suspension produced higher impact factors than when loaded. Measured results from an unloaded truck taken over a short length of highway tended to give higher results than the model; but in the loaded condition, the measured and model results are in good agreement. Halving the amplitudes of a new motorway profile reduced the percentage RMS load above the steady unloaded weight by only

3% at 64 kph and 5% at 96 kph. The RMS dynamic load remains reasonably constant with increased payload.

by I. B. Laker
Transport and Road Res. Lab., Transport Engineering Div., Crowthorne, Berks., England
Rept. No. TRRL-SR-360; 1978; 31p 8refs
Availability: Corporate author

HS-024 817

CRASHWORTHINESS OF VEHICLES. AN INTRODUCTION TO ASPECTS OF COLLISION OF MOTOR CARS, SHIPS, AIRCRAFT, AND RAILWAY COACHES

Material from many sources is assembled and presented as a comprehensive introduction to the mechanics of vehicular impact, the plastic deformation processes which result, and the consequences for human passengers. The basic concepts of multicollisional situation for transported bodies, impact crushing of vehicles--retardation rate and vehicle length, and impulsive loading of a plane rigid body--the circle of constant acceleration, are discussed briefly. Impact and design for impact situations are separately presented for motor vehicles, railroad cars, aircraft, ships and elevators. Abundant photographs and illustrations complement the text. Broadly considered are damage to the structure and injury to the persons transported. This review of vehicle crashworthiness is intended primarily for engineers and students, but may be useful to anyone with a moderate technical background. References are provided for each of the separate discussions. An approximate theory for plastic bending and unbending over a roll is appended. Author and subject indexes are provided.

by W. Johnson; A. G. Mamalis
University of Cambridge, Dept. of Engineering, Cambridge, England
Rept. No. MEP-56; 1978; 130p refs
Availability: Mechanical Engineering Publications Ltd., London, England 4 pounds

HS-024 819

BICYCLE TRANSIT. ITS PLANNING AND DESIGN

A guideline for establishing bicycle planning and design criteria for transit systems is presented. With the goal of comprehensive transit planning, this reference book brings together many current ideas and projects from recent bikeway and urban planning studies, both in the U.S. and abroad. Chapters deal separately with the history, planning, design, legislation and future prospects of bikeway systems. An extensive research bibliography lists bicycle studies by state and country; those sources which provide highly pertinent information are indicated; mailing addresses are included in most cases. Additional references are listed under a book or periodical/pamphlet heading and categorized as botanical, historical, general, legal, parks and recreation, or transportation. Appended are bills of the California and Oregon state legislatures relating to bicycle transit facilities.

by Bruce L. Balshone; Paul L. Deering; Brian D. McCarl
University of Oregon, Oregon Bicycle Transit Study Com.
1975; 178p 197refs
Praeger Special Studies, Design/Environmental Planning Series.
Availability: Praeger Publishers, 111 Fourth Ave., New York, N.Y. 10003

HS-024 820

INCREASING MOTOR CARRIER PRODUCTIVITY. AN EMPIRICAL ANALYSIS

Productivity of the U.S. trucking industry is discussed in terms of the historical development of restrictive covenants and their effects; the current status of weight and dimension regulation is analyzed; and a model is formulated to ascertain the effect of size and weight maximums upon motor carrier productivity. Because of certain institutional constraints, increasing state maximum weights and lengths to the standards prescribed by the Federal government appears to be the optimal method for increasing carrier productivity. Four recommendations are proposed: grandfather provisions should be phased out of existing legislation and prohibited in future size and weight statutes; a nationwide classification of highways, extending beyond the current categorizations, should be conducted, with each highway receiving a rating based on national standards; twin-trailer operation (2-S1-2 and 3-S1-2) should be sanctioned immediately on the interstate highway system; and oversize-overweight permit operation should be standardized and strictly enforced in the U.S. It is also suggested that the optimum density of the major vehicles engaged in intercity freight be calculated and consulted for determination of the optimal vehicle that can be utilized on a particular route configuration.

by Grant M. Davis; John E. Dillard, Jr.
University of Arkansas, Coll. of Business Administration;
Virginia Polytechnic Inst. and State Univ., Coll. of Busines,
Blacksburg, Va.
1977; 142p 105refs
Praeger Special Studies in U.S. Economic, Social, and Political
Issues.
Availability: Praeger Publishers, 200 Park Ave., New York,
N.Y. 10017

HS-024 821

HOW TO BUY A BATTERY FOR YOUR CAR

Information for the car owner is presented to aid in selecting the right replacement battery. The general buying advice presented should help the consumer whether he has time to select carefully or is limited by an emergency to only a few choices. To aid in interpreting the specifications in the battery ads and catalogs, battery size, electrical capacity, cold-cranking capacity, and reserve capacity are explained. Suggestions are given regarding whether to purchase maintenance-free or conventional batteries; tips on warranties are provided. Several battery dealers were surveyed by telephone for a 60-month replacement battery for a 1974 Chevrolet Impala with a 350 cu in, V8 engine (size 74 battery standard). The responses of the dealers highlight some of the pitfalls one might encounter when shopping for a replacement battery. It is suggested that if one plans to keep his car a long time, he should concentrate on getting the longest and best warranty for the money; if one plans to keep the car only a short time, choice may be made more by price than by warranty. A checklist is provided to aid the car owner in determining whether when the engine fails to start it is because of battery failure or because of some other component malfunction. Ten ways to help a battery last longer are outlined.

Publ: Consumer Reports v44 n1 p39-41 (Jan 1979)
1979; 2refs
See also HS-024 822.
Availability: See publication

HS-024 822

BATTERY BOOSTER CABLES

Results of tests are reported on 49 models of battery booster cables, ranging in list price from \$3 to \$56. Booster cables were judged by length (8 to 20 ft or over), cable construction ("tangle resistant" vs. separate cables), wire and insulation, and clamps (spring-loaded alligator type). Most cables have metal clamps, but some have plastic clamps with metal inserts, a possible advantage for reducing short circuit risk in cars with little clearance around the positive battery terminal. Clamps are color coded to avoid improper connections. The electrical connections in the booster cables were tested and rated according to the amount of current they could carry without producing a voltage drop above a certain figure. The security of the clamps on the wires was also tested; some cables have an extra restraint at the clamp to prevent flexing at the electrical connection. Flexibility of cables under extreme cold was also tested, as was resistance of clamps to corrosion from salt. Clamps with heavy riveted-in jaws were more rust-resistant than one-piece clamps. It is noted that high price does not guarantee high quality. "Check-rated" models (those most highly recommended) include M. Black TDR16Q (\$31), Wells Juicer BC340 (\$27), Sears Cat. No. 7101 (\$21), Deka BD94X (\$56, similar to Sears 7101), Carol 20412 (\$41), Carol 20416 (\$45, similar to Carol 20412), J.C. Penney No. 8208 (\$22, similar to Carol 20412, and Ward's Cat. No. 12060 (\$19, similar to Carol 20412). All of these are heavy duty cables; other heavy-duty cables are rated, as are medium, light, and very-light-duty cables. A separate note illustrates and explains the proper method for using booster cables safely.

Publ: Consumers Reports v44 n1 p42-6 (Jan 1979)
1979
See also HS-024 821.
Availability: See publication

HS-024 823

DISCIPLINE. KEY WORD TO MOTORCYCLE SAFETY

A disciplined rider always uses common sense and experience and always follows the basic rules of motorcycle safety. Cyclists should go through the pre-ride checks that are included in the owner's manual. Other precautionary measures that should be practiced at all times include using both front and rear brakes, replacing tires before they are dangerously worn and installing new tubes, keeping the load within allowable limits and distributing it properly, and wearing a good helmet. Wearing shorts and sandals may be comfortable, but the chances for severe sunburn or scraped skin if a motorcyclist is involved in an accident are greater than if a rider were wearing more substantial clothing. Disciplined riders realize that oppressively hot days lead to fatigue and drowsiness, and they make frequent rest stops and drink plenty of fluids. Long-distance riding should be done only by experienced cyclists who use their common sense. The disciplined motorcyclist always watches the road conditions (e.g. gravel, wet roads, oil on the pavement, turns, rises, unfamiliar roads, animals). To make it easier for other motorists, the motorcyclist should wear brightly colored clothing, use reflective tape on the bike and helmet, and keep the taillight lens clean. Moderate speeds with brief rest stops are recommended. Defensive riding is safe riding; the motorcyclist should discipline himself to be al-

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HS-024 826

ways on the defensive--to anticipate potential accident situations.

by Eugene Alvarez

Publ: Driver v12 n7 p10-12 (Dec 1978)

1978

Article first appeared in American Motorcyclist.

Availability: See publication

HS-024 824

THE SAFEST WAY TO CRASH...DON'T. AN EXAMINATION OF EMERGENCY BRAKING TECHNIQUES

Motorcycle emergency braking techniques when there is not possibility of maneuvering safely out of harm's way are examined. It is never advisable to lay a motorcycle down deliberately in order to avoid an impact; "laying it down" is one of the most persistent myths in motorcycling. The alternative is to leave the machine on its feet; the tires and brakes are designed to stop the motorcycle, and perform that function if they are used properly and without panic. In braking, the motorcyclist must take into consideration the stopping distance (equals velocity squared divided by 30 times the coefficient of friction, the vehicle coming to a stop faster as the speed diminishes) and reaction time (3/4 of a second to react to a critical situation, distance traveled in that time equal to 1.1 times the speed of the motorcycle). The motorcyclist must anticipate critical situations and slow down when approaching them (e.g. intersections). The rider must develop confidence in the emergency braking method and his ability to perform the technique. Staying on the brakes may require behavioral changes on the part of the motorcyclist, and the way to build confidence is by practice. Only by performing a technique repeatedly until it is ingrained can it become a useable skill. The braking procedure involves staying on the brakes as long as the bike continues to move; the rear brake is locked up with the bike yawing to the left and right of the line of travel; at the same time, the rider "plays the front brake" (squeezing the forward brake lever with maximum pressure, releasing that pressure for a fraction of a second, then squeezing again) while steering the front wheel along a course equal to or parallel to the line of travel. If this action is continued, the bike will come to a stop, with luck before the obstacle is struck or will strike the object at a speed below the 15 mph critical speed. The key is not to panic; practice of both physical skills and mental anticipation will help immeasurably.

by Robert Nichols

Publ: Driver v12 n7 p14-21 (Dec 1978)

1978

Reprinted from Road Rider.

Availability: See publication

HS-024 825

AUTOMOTIVE PAINTING. PT. 2

In the last of three articles on auto body repairing and painting for the amateur (the other two dealing with dent removal, sanding, metal prepping and priming, spray guns, lacquers, enamels), the two final steps in the process, masking and painting, are discussed. Areas that are not to be spray painted, such as chrome, glass, and different colored body panels, are protected by masking tape, masking paper, or a combination of the two. Information is given on the use of quality products

for masking, masking rules, and masking techniques (tips on masking trim, windshield, body panels, upholstery, headlights, wheels, antenna). A brief review is given of the adjustment controls of the spray gun. Information is provided on paint spraying: air pressure, distance, stroke, paint sequence, spraying temperature, and techniques (with special instructions for each type of coating: nitrocellulose lacquer, acrylic lacquer or acrylic enamel, enamel). Photographs are provided to demonstrate painting procedures.

Publ: Driver v12 n7 p22-8 (Dec 1978)

1978; 2refs

At head of title: The Backyard Mechanic.

Availability: See publication

HS-024 826

TESTING FRONT TIRES. THIRTEEN STREET TIRES EVALUATED FOR BRAKING ABILITY, HANDLING AND CONTROL [MOTORCYCLES]

Objective and subjective evaluations were made of thirteen motorcycle tires as used on the front of a stock Suzuki GS750 during track testing. Test laps included all-out cornering with the kickstand and center stand limiting cornering speed. Only the front brake was used for braking tests; the front wheel was kept from locking. The track included different surfaces (providing a measure of traction at the slippery boundary of two surfaces), painted lines, and enough room for safe operation at speed. Each tire was run 10 laps. Mounted on the rear of the test bike was a Michelin M45 4.00-18 tire which was felt to provide the greatest cornering ability and safety based on earlier testing of rear-mounted motorcycle tires. The tires tested were the Avon Roadrunner, the Bridgestone Mag Mopus Tubeless, the Carlisle ST, the Cheng Shin C701, the Continental RB2, the Dunlop K91 Mk11 Tubeless, the Goodyear Eagle G/T, the IRC Grand High Speed GS-11AW, the Michelin M45, the Nankan N-773, the Nitto NT-170 Ontario AR 80, the Pirelli Super Sport Gordon, and the Yokohama Speedmaster 990. The following information, some provided by tire manufacturers, is presented in charts for each tire: general (country of origin, model, size, price), specifications (diameter, width, aspect ratio, footprint area, tread depth (center), plys/ply rating, cord material, maximum load, weight, imbalance, eccentricity, pre-test and post-test durometer reading and track performance (temperature (10 laps, center tread), temperature (10 laps, side tread), braking and degree of control (30 mph to 0 mph), braking and degree of control (60 mph to 0 mph), pre-corner braking control, cornering traction, and confidence in tire). The top three tires in braking ability were Goodyear, Carlisle, and Michelin. Subjective ratings (with emphasis on cornering ability) gave the Continental, Michelin, and Pirelli tires an Excellent rating. The tires rated highest in these categories vary according to construction; the selection of a tire depends on the motorcyclist's priorities. Michelin is cited as one of the best handling tires in front or rear, with good stopping ability and very good control, and the Carlisle front tire, with the second shortest combined stopping distances and a Very Good rating for cornering, the best buy with a list price of \$23.98.

Publ: Cycle World v18 n1 p112-8 (Jan 1979)

1979; 1ref

Availability: See publication

HS-024 827

WHITEOUT: WINTER'S WORST SUPERHIGHWAY NIGHTMARE

Safety tips for driving in snowbelt areas, particularly where "whiteouts" are encountered, are presented. The hazards of the whiteout, a wall of rolling snow, are illustrated by the account of an incident on Interstate 81 near Binghamton, N.Y. which resulted in a chain-reaction traffic accident involving 45 damaged cars and trucks, one fatality, and over 40 injured motorists. In some states, such as New Hampshire, screening of some "chutes" (areas where wind and snow can combine to result in a whiteout situation) is being done by using pine trees as windbreaks; windsocks are placed along some dangerous spots, as well as warning signs. Engineers in Binghamton may be asked to reshape the side of a mountain to change local wind-flow characteristics. It is suggested that strobe lights, properly aimed to avoid glare, could be used over short, critical distances to delineate the road's edge. The following safety tips are outlined: prepare well in advance, know the storm conditions in the area in which you are going to travel, know about fair-weather whiteouts (when a big clear-off wind comes roaring down, usually within 24 hr after any big snowstorm on its way eastward), start traveling at once when you hear a heavy-snow warning or else remain where you are, stay off the Interstates when driving to maneuver around a storm, urge local media to add "urgent whiteout warnings" to their forecasts, use snow tires (and also put chains on summer tires and carry them along), and put car headrests in upright position. Special instructions for driving in a whiteout situation include the following: pick a safe spot and wait, or else retreat to safer area; if you must go on, take bearings on last visible objects, try to follow wheel tracks, pick out reflectors, flash high beams frequently, run with lights on, sound horn frequently, slow down enough to cut speed differential between you and other vehicles, stop and clean headlights, taillights, and side reflectors (if you can find a turnout), expect slippery ice, make sure windshield and wiper blades do not have ice buildup, use a CB if available, not only to warn others but to ask what lies ahead, and if forced to stop, get everyone away from the road, leave headlights on at night with flashers working, and use taillights and flashers by day. Three rules to remember include never head knowingly into whiteout trouble, add weight to rear axle of any rear-drive car, and try to maintain total silence to aid concentration.

by Edward Fales, Jr.

Publ: Popular Mechanics v151 n1 p68-71, 124 (Jan 1979)

1979; 1ref

Availability: See publication

HS-024 828

NOW OUR OCEAN NAVIGATION SYSTEM CAN KEEP TRACK OF YOUR CAR

Loran C, an astoundingly accurate navigation system used at sea for many years, now is being considered for many land-based applications including the guiding and tracking of motor vehicles. Now that more Loran (Long Range Navigation) transmitters are coming into operation, their signals soon will cover much of the U.S. land area (2/3 of U.S. by Feb 1980), as well as the ocean. Signals are received from three stations, two "slaves" and a "master". By comparing difference in time for each signal to arrive, an accurate location may be plotted. Presently, these time-difference lines must be plotted on a chart; but in the future, computers could change the data into

an easily usable and understandable form. One experimental program using Loran C involves the Federal Hwy. Administration and the National Hwy. Traffic Safety Administration who have been following a van as it travels in the Washington, D.C. area. A receiver in the van converts the Loran coordinates to audio tones and feeds them to a tape recorder. Later, the tape is fed to a plotting machine and the coordinates are converted into a graphic display on a small green-tinted screen. The path of the van shows up as a line of numbers marking the course. To make a complete picture of where the van went on its recorded run, researchers call up a prerecorded map from a computer; roads appear as white lines. The system can be used to determine vehicle speed, total distance traveled, and location at any time the tape was on. Another project during the past year, in Tennessee, has collected data on the use of Loran in 13 highway patrol cars. A receiver fits under the dashboard of a police car and pulls in Loran signals from a yard-long antenna. The primary use has been to locate accident sites in an effort to improve safety by identifying hazardous road areas. Other possible applications of Loran include Census Bureau data collection operations, tracking of emergency vehicles, determining whether correct paths are being followed by planes during insecticide spraying operations, and use of Loran coordinates by homeowners to aid emergency vehicles in finding their homes, especially in rural areas.

by Gurney Williams, 3rd.

Publ: Popular Mechanics v151 n1 p80-2, 144 (Jan 1979)

1979

Availability: See publication

HS-024 829

WHAT YOU SHOULD KNOW ABOUT THE CARE, TESTING AND RECHARGING OF MAINTENANCE-FREE BATTERIES

It is estimated that 87% of the batteries put into new cars and sold by aftermarket distributors between 1977 and 1980 will be maintenance-free or low-maintenance units. Information is provided to assist the car owner in understanding the differences between these new batteries and conventional ones, and in maintaining the new battery. A low-maintenance battery requires the same maintenance as conventional batteries, although not as often. This entails checking the electrolyte level every 12 months or 10,000 mi to 15,000 mi, keeping battery and connectors clean, and testing the state of charge when a starting problem appears to be caused by battery failure. Maintenance-free batteries require service (not maintenance) when a starting problem occurs to determine if the starting failure is caused by the battery. An "eye" in some maintenance-free batteries indicates the correct test procedure when there is a no-start condition. If the eye has a green dot, it is safe to load-test the battery to determine if it is causing the starting problem. The load-testing procedure is outlined in service manuals. If a minimum voltage is not attained during the load test (9.6 volts at 70 degrees F or above), the battery has to be replaced. If the eye is dark (no green dot), the battery should be charged before it is load-tested. Rate of charge varies with battery model and is outlined in service literature. Charging should be halted when the green dot appears or when maximum charge is reached. If the eye is pale or light, the battery should not be charged or tested; the electrolyte has been depleted, and, since water cannot be added, the battery must be replaced. If the battery is a type that does not have an eye, the top of the battery will allow access to the cells and the

battery's state of charge can be checked in the usual manner. It is necessary to avoid tipping batteries, even maintenance-free ones; they should be stored upright in a cool, dry place. Maintenance-free batteries can be jump-started in the usual manner, except that vent holes need to be covered with a clean cloth to prevent any escaping gas from possibly being ignited by a spark.

by Mort Schultz

Publ: Popular Mechanics v151 n1 p106-8 (Jan 1979)
1979

At head of title: Saturday Mechanic.

Availability: See publication

HS-024 830

THE GAS SQUEEZE. IS RATIONING THE ANSWER TO A PERPLEXING DILEMMA?

Under a provision of the Energy Policy and Conservation Act of 1975, the Dept. of Energy (DOE) is required to develop an emergency rationing plan for gasoline sales. A plan has been proposed and currently is going through the legislative and public procedures required by law; it should be approved sometime this year. Under the plan, the owner of each registered vehicle would be allocated coupons or checks which would allow him to buy gasoline. These coupons would be given on a priority basis, with supplemental rations for maintaining essential services and the economy. DOE estimates that, based on a 20% shortfall in gasoline supply, the monthly ration for an eligible individual would be 40 to 45 gal. A key feature of the plan would allow the free trading or sale of ration rights. The DOE plan would go into effect only if the President declared that a severe energy supply interruption exists. He then would have to inform Congress of his decision and set a date for implementation. The plan would have to be effect within 45 days of that date and, by law, would be limited to a 9-month duration. This period could be extended by Congress for as long as the emergency situation existed. Those in and out of government who are strongly supporting gas rationing tend to gloss lightly over some unanswered questions which include how much should the U.S. reduce its oil consumption, will rationing reduce imports, who will be eligible and for how much, who will administer the rationing program, and, most important, will the public accept a rationing plan. Gasoline rationing is a sensible way to deal with a serious and perceptible emergency; but, barring that, it is a premature and drastic way of forcing conservation.

by Fred M. H. Gregory

Publ: Motor Trend v31 n1 p70-2 (Jan 1979)
1979

Availability: See publication

HS-024 831

MOTOR VEHICLE EMISSIONS AND ATMOSPHERIC LEAD CONCENTRATIONS IN THE LOS ANGELES AREA

Atmospheric lead (Pb) concentrations in the Los Angeles area have been found to be dependent on Pb (leaded gasoline) consumption, meteorology, and source-receptor relationships. Mathematical relationships between these variables for selected Los Angeles sites (downtown Los Angeles and Lennox, near L.A. Airport) are derived. Log Angeles County experienced a 50% reduction in annual average atmospheric Pb

concentrations between 1971 and 1976, which was found to be the result of a decrease in vehicular emissions of Pb. Seasonal variations in Pb concentration were found to be mainly a product of seasonal variations in weather. Projections of atmospheric Pb concentrations for the next decade show a continued downtrend, based on regulation of fuel Pb content and introduction of additional catalyst-equipped vehicles. By the mid-1980's, most locations in the Los Angeles area are expected to attain the California and Federal ambient air quality standards for Pb, 1.5 microg/cu m, based on a monthly average.

by Margaret C. Hoggan; Arthur Davidson; Margaret F. Brunelle; John S. Nevitt; John D. Gins

Publ: Journal of the Air Pollution Control Association v28 n12
p1200-6 (Dec 1978)
1978; 23refs

Availability: See publication

HS-024 832

MOTOR VEHICLE LEAD EMISSIONS IN THE UNITED STATES: AN ANALYSIS OF IMPORTANT DETERMINANTS, GEOGRAPHIC PATTERNS AND FUTURE TRENDS

A simple method is presented for estimating motor vehicle lead (Pb) emissions for large areas, the method utilizing composite emission factors which incorporate information on vehicle Pb emission rates, sales-weighted average fuel economies, annual vehicle travel fractions, and average gasoline Pb concentrations. The estimation procedure takes as given estimates of motor vehicle travel by vehicle type and hence can be applied to any region or road system for which current or projected travel estimates are available. Estimates of motor vehicle Pb emissions for major highway systems in individual states for 1975 and national forecasts of motor vehicle Pb emissions for six potential scenarios for future (1975-1985, 1990; 1995, 2000) use of Pb additives in gasoline are presented to demonstrate the application of the method. The 1975 estimates indicate that 60% of motor vehicle Pb emissions occur in urban areas and 40% in rural areas. The urban emissions are concentrated primarily in the metropolitan areas of ten densely-populated industrial states (Massachusetts, New Jersey, California, New York, Illinois, Michigan, Florida, Texas, Ohio, Pennsylvania) where one-third of the nation's total exhausted Pb from motor vehicles occurs. In the future, total Pb emissions will be affected primarily by reductions in gasoline Pb content, improvements in vehicle fuel economy, and the growing use of unleaded gasoline. Various regulatory policies have been implemented which are intended to reduce the tetraethyl lead content in gasoline and to increase fuel economy. The additional reductions in Pb emissions achieved by the phased reduction schedule and mandatory fuel economy standards are likely to be very slight compared to reductions realized by the retirement of pre-catalyst vehicles. The future prospect of continued widespread use of leaded gasoline and the consequent pervasive emission of Pb particulates is heavily dependent on the development and general use of a lead-tolerant emission control system. In the absence of such a development, the use of Pb in gasoline will in all likelihood completely disappear by the mid-1980's.

by George Provenzano

NSF-ENV-74-24276

Publ: Journal of the Air Pollution Control Association v28 n12
p1193-9 (Dec 1978)
1978; 31refs

Availability: See publication

HS-024 833

**VEHICLE DETECTION. PHASE 3: PASSIVE BUS
DETECTOR/INTERSECTION PRIORITY SYSTEM
DEVELOPMENT. OPTION 2: MANUFACTURING
DRAWINGS AND PROTOTYPE DEVELOPMENT.
OPERATION AND MAINTENANCE MANUAL**

This manual contains the installation, operation, and maintenance instructions for the Passive Bus Detector (PBD) system. In addition, general operating theory, front panel indicators and controls, and input/output functions are discussed. General information is presented to encourage the system's use where mass transit bus priority and monitoring can be used to advantage. Included in the manual are diagnostic procedures, functional module descriptions, schematics, and parts lists. The PBD is a stand-alone, microprocessor-based system for passively detecting the presence of widely-used 40-ft to 60-ft mass transit buses on a roadway. The PBD uses the inductive-loop transducer. No bus driver cooperation is required other than the operator's driving the bus over the detection zone of the loop(s). The PBD system consists of two components; they are a four-pack Inductive Loop Detector Unit (ILDU), and a 16-channel Bus Classifier Unit (BCU). Each Inductive-Loop Detector (ILD) is a high-quality detector which drives the inductive loop and extracts changes in loop inductance due to vehicle presence. In addition, it contains the vehicle and bus call relays. The system's intelligence is located in the BCU which is organized around the National Semiconductor IMP-16C microcomputer. The BCU contains two microprocessors which process the raw detector information from a maximum of 16 ILD's (four 4-pack ILDU's). The bus/no-bus decision made by the BCU is returned to the respective ILD. When operated with a 6-ft x 6-ft loop, correct classification of mass transit buses (40-ft) should reach or exceed 95% with less than 1% false classification.

by Roger A. Lubke; Darrell D. Sawyer
Honeywell Inc., Defense Systems Div., 2600 Ridgway Pkwy.,
Minneapolis, Minn. 55413
DOT-FH-11-8149
Rept. No. FHWA-RD-77-120; F2186-FR1; 1977; 146p 1ref
HS-024 834 is an IMP-16C Application Manual; HS-024 835 is
the Final Rept.; HS-024 836 is a Classifier Handbook.
Availability: NTIS

HS-024 834

**VEHICLE DETECTION. PHASE 3: PASSIVE
DETECTOR/INTERSECTION PRIORITY SYSTEM
DEVELOPMENT. OPTION 2: MANUFACTURING
DRAWINGS AND PROTOTYPE DEVELOPMENT.
IMP-16C APPLICATION MANUAL**

This manual, a National Semiconductor Corp. publication (NSC-4200021C), provides information required for a user to become familiar with National Semiconductor's IMP-16C (Integrated Microprocessor-16C) functional and logic circuits, instruction set, and general input/output interfacing, and describes a general system verification procedure. With this information, the user may adapt the IMP-16C microprocessor to his particular application(s). The IMP-16C Interfacing Guide (formerly issued as NSC-4200035A) is presented as Supplement 1 to this manual. The IMP-16C is a 16-bit microcomputer for general-purpose use. The central processor unit is built from four 4-bit-slice arithmetic logic unit P-MOS (P-Type

Metal Oxide semiconductor) technology. An extended instruction set option is available.

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DOT-FH-11-8149
Rept. No. FHWA-RD-77-121; F2186-FR2; 1977; 171p
HS-024 833 is an Operation and Maintenance Manual; HS-
835 is the Final Rept.; HS-024 836 is a Classifier Handbook.
Availability: NTIS

HS-024 835

**VEHICLE DETECTION. PHASE 3: PASSIVE BUS
DETECTOR/INTERSECTION PRIORITY SYSTEM
DEVELOPMENT. OPTION 2: MANUFACTURING
DRAWINGS AND PROTOTYPE DEVELOPMENT.
FINAL REPORT**

Results are presented of an effort to develop a production prototype model of the Passive Bus Detector (PBD). This model is the outgrowth of the PBD/Intersection Priority System which was developed earlier. The PBD is a stand-alone, microprocessor-based system for passively detecting the presence of widely-used 40-ft to 60-ft mass transit buses on a roadway. The original PBD concept included a traffic controller as an integral part of the device. In the production prototype, the system was reconfigured to remove the controller, thus making bus preemption a more flexible system in terms of hardware systems configuration. In an effort to reduce the production costs as much as possible, several interesting equipment packaging concepts were formulated. The basic block modules were changed very little from the engineering model. The PBD system consists of two components: a 116-channel Bus Classifier Unit, and special inductive-loop electronics in the form of an Inductive-Loop Detector Unit. The National Semiconductor IMP-16C microcomputer was retained for use in the classifier unit. The production prototype model was evaluated in a typical traffic intersection with a typical traffic controller; operation for a month period was successful.

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DOT-FH-11-8149
Rept. No. FHWA-RD-77-122; F2186-FR3; 1977; 302p
Rept. for 30 Nov 1976-31 Oct 1977. HS-025 833 is an
Operation and Maintenance Manual; HS-024 834 is an IMP-
16C Application Manual; HS-024 836 is a Classifier Handbook.
Availability: NTIS

HS-024 836

**VEHICLE DETECTION. PHASE 3: PASSIVE BUS
DETECTOR/INTERSECTION PRIORITY SYSTEM
DEVELOPMENT. OPTION 2: MANUFACTURING
DRAWINGS AND PROTOTYPE DEVELOPMENT.
CLASSIFIER HANDBOOK**

This handbook provides its users basic working knowledge of Bus Classifier Unit (BCU) concepts, acquaints them with the procedures used to design a BCU for a Passive Bus Detector (PBD) system, and instructs them in using a computer program in a bus detector classifier design. This handbook is directed towards the engineers who will be adapting the PBD/Class

to new vehicle identification problems. The PBD is a stand-alone, microprocessorbased system for passively detecting the presence of mass transit buses on a roadway. It consists of the BCU and an Inductive Loop Detector (ILD) Unit. The BCU is the device which receives a vehicle signature from the ILD and analyzes the signature's shape. If the signature belongs to that of a bus, the BCU issues a signal to the ILD, which, in turn, initiates a bus call to the traffic controller. Passive bus sensor characteristics that are important for vehicle identification are discussed. The basic ideas of pattern recognition are introduced and discussed from a geometric and trial-and-error point of view. The basic theory of optimal classifier design is presented and compared with the preceding geometric discussion by using the idea data set complexity. These ideas and the operation of the Cascaded Threshold Classifier (CTC) program are illustrated with two detailed numerical examples. A step-by-step description of the design of a bus classifier is presented, showing the reasoning and method used in developing the classifier equations. The CTC program attempts to provide practical solutions for practical problems. It contains a variety of data manipulation subroutines, including optimal classifier solutions, along with a control structure that allows the user to apply them interactively and thus discover the characteristics of the data and develop the classifier in small steps. A complete flowchart of the program and a fully annotated Fortran listing are included.

by Rodney M. Larson

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DOT-FH-11-8149

Rept. No. FHWA-RD-77-123; F2186-FR4; 1977; 313p 5refs
HS-024 833 is an Operation and Maintenance Manual; HS-024 834 is an IMP-16C Application Manual; HS-024 835 is the Final Rept.

Availability: NTIS

HS-024 837

DRIVING OFFENDERS AND THE DEFENSIVE DRIVING COURSE. AN ARCHIVAL STUDY

Two-hundred and seventy-five New Zealand drivers who had been required by court order to attend the Defensive Driving Course (DDC) were compared on six posttreatment driving measures obtained from archival data with 275 drivers who had received standard treatment at a court appearance. The National Safety Council's (U.S.) DDC consists of eight one-hour lecture (with films) sessions (or four two-hour sessions) which cover the following topics: determining preventability of an accident, how to avoid a collision with a vehicle ahead, how to avoid a collision with a vehicle behind, how to avoid a collision with an oncoming vehicle, how to avoid an intersection collision, the art of passing and being passed, the mystery crash, and how to avoid other common types of collisions. Evaluation studies of the DDC effectiveness by various researchers have shown mixed results. In the present study, the traffic records of the experimental group and the matched standard treatment group were compared for a period 12 months before the DDC was administered and a period of 12 months after the experimental group completed the course. Comparisons were made on the total number of traffic accidents, accident-promoting convictions, serious convictions, nonserious convictions, speeding convictions, and nonaccident-promoting convictions. Based on the before-after study results, the DDC group showed greater reductions in serious and accident-promoting convictions but no greater reduction in accidents compared with the comparison group. There is some

suggestion from the results of the study that DDC treatment may have been effective in terms of attitudinal intervention, but DDC experience does not have an enhanced effect on driver psychomotor skills, nor can it reduce the influence of possible non-driver situational factors, such as intersection design. DDC will be of little relevance in influencing nonaccident-promoting offenses, such as exceeding parking limits. There are limitations to attitudinal-level interventions. These interventions may have some utility for the large group within the driving population not dealt with by the courts, by improving what are usually favorable driver attitudes, and also might effect some improvement in driver attitudes of drivers assigned to the DDC by the court. But it is unlikely that any form of attitudinal intervention can have a direct effect on accident rates.

by Peter S. Hill; Bruce D. Jamieson

Publ: Journal of Psychology v98 p117-27 (1978)

1978; 13refs

Availability: See publication

HS-024 838

A TECHNIQUE FOR MEASURING THE SOUND OF A MOVING TIRE

A measurement and analysis technique to determine the narrow band spectra and the radiation patterns of the sound emitted by a moving tire is presented. The sound is measured by a semicircular array of stationary microphones as the tire passes by the array, and is recorded on a multichannel tape recorder. In the analysis procedure, corrections are made for effects associated with a moving sound source, such as the nonstationary character of the signal as the result of the time-dependent transmission path and the Doppler frequency shifts. In this way the power spectra and the radiation pattern of the sound signal are determined as if the receiver were moving with the tire at a fixed distance. A relationship between the Doppler effect and the frequency resolution associated with the finite Fourier transform is presented. This relation is used as a basis for the Doppler correction procedure.

by J. Y. Chung; I. D. Wilken

Publ: Journal of Sound and Vibration v55 n1 p9-18 (8 Nov 1977)

1977; 4refs

Presented at 90th Meeting of Acoustical Society of America, San Francisco, 3-7 Nov 1975.

Availability: See publication

HS-024 839

ABOUT THE NEW COATING-ON-PLASTICS TECHNOLOGY

A new solvent-recovery system has been developed which enables conventional solventborne coatings to meet Federal emission standards while providing energy savings of up to 90%; its key feature is the use of recovered solvent to fire ovens. Waterborne solvent (WBS) technology has markedly improved, in particular with a new series of high-performance coatings based on urethane chemistry. Initial applications include topcoats for vinyl auto upholstery, interior ABS trim, and business-equipment cabinetry, and primers for exterior sheet molding compound and urethane elastomers. Desirable properties include emission considerations, high abrasion resistance, and high impact resistance particularly at low tem-

perature. Present WBS's meet existing auto, business-machine, and appliance specifications in terms of hardness, impact, abrasion, appearance, gloss, humidity, and water-soak performance. These WBS's minimize or eliminate the usual coating problems caused by solvents, but drying times are slower, surface contaminants must be controlled, stainless-steel equipment must be used, cleanup can be difficult, and their long-term shelf stability is uncertain. The new higher-solids (HS) coatings promise improved performance and lower costs. These new HS coatings can be sprayed electrostatically, they cover and fill surface imperfections and yield a high-gloss finish. Further advantages include lower emissions; cost savings through greater coverage per gallon and reduced thinner requirements; high levels of abrasion, hardness and adhesion; chemical resistance; good wetting characteristics; and easy clean-up. Because of their high film thicknesses HS coatings can hide processing errors. However, HS coatings are two-package systems with limited potlife; special equipment is required because of high viscosity. Single-step coating systems for polypropylene now offer stubborn resistance to gasoline as well as improved hardness. Second-generation coatings provide effective and economical shielding against electromagnetic interference. These products are tougher; more resilient to heat, humidity, and salt spray; can be applied using conventional spray techniques, and be used on virtually all plastics cabinetry. Electron-curing (EC) technology makes possible significantly improved coated products and brings coating practicability to plastics long considered impossible to coat. EC curing uses less energy, produces no emissions, has line speeds to 1000 ft/min, more precise process control, improved adhesion through grafting, less equipment space requirements, and a more complete cure. The films produced have better scuff resistance, print receptivity and gloss, higher ultraviolet resistance, abrasion resistance, and greater washability; coated vinyls have superior toughness, chemical resistance, and an improved "wet look." Applied to rough surfaced plastics EC cure results in improved decorability and gloss, and improved strength and burst characteristics.

by A. Stuart Wood
 Publ: Modern Plastics v55 n12 p36-9 (Dec 1978)
 1978
 Availability: See publication

AN EQUILIBRIUM EQUATION FOR ROAD TRAFFIC

Equilibrium equations are developed which deal with the relationship between speed distribution and flow or concentration on a road with the possibilities of overtaking. The mean time spent by a vehicle that wishes to travel at speed u behind a vehicle with speed v is described by an expression that depends on the flow of platoons in the opposite lane and on the frequency of sight hindrances. The effects of varying concentration on speeds in both lanes are illustrated with an example.

by Ake Svensson
 Publ: Transportation Research v12 n5 p309-13 (Oct 1978)
 1978; 10refs
 Availability: See publication

AN APPROXIMATE ANALYTIC MODEL OF MANY-TO-MANY DEMAND RESPONSIVE TRANSPORTATION SYSTEMS [TAXI; DIAL-A-BUS]

An analytic model is presented which predicts average waiting and riding times in such urban transportation systems as dial-a-bus or taxicabs, which provide nontransfer, door-to-door transportation with a dynamically dispatched fleet of vehicles. Three different dispatching algorithms are analyzed with a simple deterministic model, which is then generalized to capture the most relevant stochastic phenomena. The formulas obtained have been successfully compared with simulated data and are simple enough for hand calculation; they are helpful that they aid the researcher to avoid cumbersome simulation models.

by Carlos F. Daganzo
 Publ: Transportation Research v12 n5 p325-333 (Oct 1978)
 1978; 14refs
 Availability: See publication

THE EFFECT OF BUS DETECTION ON THE PERFORMANCE OF A TRAFFIC SIGNAL CONTROLLED INTERSECTION

Possible improvements are considered to the overall performance of a traffic signal-controlled intersection when a bus-actuated system is superimposed on fixed-time control. A hypothetical site downstream from a set of genuine signals was selected and data concerning flows, journey times, and arrival patterns of vehicles were recorded. The Transyt program was used to obtain the appropriate offsets and splits at the hypothetical site for different levels of side-road volume; these were fed into a simulation program together with the arrival times of vehicles to calculate the respective performance indices. The simulation program was then altered to represent bus-actuated system where the signals would change at the detection of buses according to a predetermined policy but subject to overriding constraints imposed by the fixed-time settings. The bus-actuated system of control best suited a high flow of buses but fixed-time control gave a better performance index with a higher bus flow.

by T. Y. El-Reedy; R. Ashworth
 Publ: Transportation Research v12 n5 p337-42 (Oct 1978)
 1978; 12refs
 Availability: See publication

DETERMINATION OF TRAFFIC DELAYS FROM SHOCK-WAVE ANALYSIS

The traffic shock-wave theory of Lighthill and Whitham is applied to a general, moving incident with filtering or overtaking. Individual and total delays and related costs can be determined simply by graphic means. A formulation which is independent of any particular macroscopic theory of traffic flow is obtained for the total delay upstream of the incident and is identical to that obtained by using deterministic queueing theory. Simple incidents such as a red traffic signal light or a slow truck in a no-passing zone are shown to be special cases.

Aug 31, 1979

HS-024 846

of a stationary incident with no filtering and a moving incident with no filtering, respectively.

by S. Chandana Wirasinghe
A4711.

Publ: Transportation Research v12 n5 p343-8 (Oct 1978)
1978; 12refs

Availability: See publication

HS-024 844

THE SOCIAL ACCEPTABILITY OF AUTO RATING CLASSIFICATION SYSTEMS

The question is posed whether the traditional method of pricing private passenger car insurance is out-dated and unfairly discriminatory. Insurance was first priced according to the horsepower of the vehicle, until it was discovered that drivers in urban areas, those who drive many miles, and young single male drivers had more accidents than other drivers, including young people with driver training. Insurance rates were then based on age, sex, marital status, and territory. State legislations in North Carolina and Hawaii have abolished these classifications, and hearings have been held in other states. Among the points at issue is the question of what is meant by fairness: actuarial, which can be verified by statistics, or ethical, in the context of social justice. Massachusetts, Florida, and California have acted to equalize the company expense portion of insurance premiums to a flat statewide fee, and Aetna Life and Casualty (L and C) has announced a nationwide equalizing program. Commissioner James Stone of Massachusetts has instituted a five-class system (standard, standard over age 65, business use, less than three years driving experience, and with driver training) which is challenged by the insurance industry. Those in the industry who advocate the retention of the present rating system foresee the possibility of massive market dislocations if companies are forced to equalize the pricing of coverage. The purpose of insurance is to spread risk among members of a homogeneous class, where the risk is predictable. The vice president of Aetna L and C warns against eliminating present variables before finding acceptable replacements. The Commercial Union Insurance Company has instituted a new experience- and incentive-oriented plan, the "Custom Auto Program" (1977). The criteria upon which the plan is based include practical, verifiable, and socially acceptable classifications, which produce homogeneous groups and incentives with the control of the insured. The classifications must contain a demonstrable cause-and-effect relationship between the rating factor and loss potential. The Commercial Union plan includes four primary rating factors (driving experience, vehicle use, annual mileage, and vehicle ownership); five secondary factors (driving record, claims history with the company, anti-theft, passive restraint credits, driver training, and territory of principal use); and two physical damage factors (vehicle make and model, and model year). The plan is in effect in Virginia and Wisconsin.

by Patricia Ancipink

Publ: Best's Review v79 n8 p10,12,82,84 (Dec 1978)
1978

Availability: See publication

HS-024 845

OUTLINE FOR TRAINING OF POWERED INDUSTRIAL TRUCK OPERATORS

Hands-on training should include driving over obstacle courses to practice turns, stops, driving on ramps, and to experience falling loads, as well as to practice maneuvering in difficult situations, recharging or refueling, and truck inspection. Verbal or classroom training should cover the following topics: differences between powered industrial trucks and cars, and between sidewalk pedestrians and plant pedestrians; operating controls and safety devices; attachments; inspections; picking up the load; travelling in various situations; setting down the load; loading and unloading boxcars and highway trucks; leaving the truck; refueling and recharging; restricted uses of trucks; maintenance and repair; and information on hazardous materials and areas, as needed. Guidelines and rules are listed under each subject heading. Employers' questions are answered about providing operator training, and lists are provided of information sources.

by Tom Davis, ed.

National Inst. for Occupational Safety and Health, Div. of Technical Services, Cincinnati, Ohio

Rept. No. DHEW-(NIOSH)-78-199; 1978; 40p

Availability: GPO, Stock No. 017-033-00322-0 \$1.50

HS-024 846

THE DRIVELINE AS A SOURCE OF VIBRATION

Torque is produced by the power source, multiplied by the transmission and transmitted through the driveshaft into a driven member, at variable rpm. The majority of applications in use today have drivelines that are relatively vibration free. Driveline vibrations caused by unbalance, torsional excitation, inertia excitation, and secondary couple effect are explained and illustrated, and corrective procedures are presented. The influence of the driveline on the system bending resonance of the engine-transmission package is explained. The few applications that have an unacceptable level of driveline vibration are usually found to have one or more of the following conditions: excessive driveshaft unbalance and/or runout; centerline to centerline length of driveshaft that exceeds recommendations when checked in relation to maximum rpm of the driveshaft; excessive size of joint angles in relation to rpm and/or joint centerline to joint centerline length of driveshaft; and natural frequency of the engine-transmission package that is at or near the maximum rpm of the driveshaft. Adhering to established straightening, balancing, and application guidelines for driveshafts will usually assure that the driveline will not have an unacceptable level of vibration.

by Robert G. Joyner

Dana Corp., Universal Joint Div.

Rept. No. SAE-780778; 1978; 16p 1ref

Technical Paper Series. Presented at Off-Highway Vehicle Meeting and Exposition, Milwaukee, 11-14 Sep 1978.

Availability: SAE

HS-024 847

RESTRAINT USE LEGISLATION: ITS PROSPECTS FOR INCREASING THE PROTECTION OF CHILDREN IN CARS

Since seat belt use laws have tended to exempt children, the increases in restraint use and decreases in occupant fatalities that have resulted from some of these laws have not been shared by children. Infants and small children held on laps during car travel are susceptible to being crushed by the persons holding them. Empirical evidence from several countries indicates that children can be protected by seat belts and should therefore be included in belt use legislation. Several Australian states have now extended restraint use legislation to children less than eight years old, requiring them to use seat belts or child restraints. European regulations vary widely in the ages, sizes, and location of persons exempt from restraint use requirements. In the United States, where no compulsory adult seat belt use legislation has been passed, Tennessee has a law in force requiring use of child restraints by children less than four years old. Unfortunately, the hazardous practice of on-lap travel is legally permitted. Present child restraint laws have major gaps and shortcomings that limit their potential effectiveness, and the currently available data indicate that the laws are only marginally effective. A major reason for exempting children from belt use legislation is that seat belt systems design for adults are erroneously thought to be injurious to children, due to various structural and biological differences. Studies of adult seat belt use by children indicate that if properly adjusted ("pulled tight"), the adult restraints offer good protection, far better than no restraint. It is concluded that significant advances in occupant protection for children or adults are achievable only through passive (automatic) protection. Passive countermeasures include non-lacerating windshields and door glazing, doors that stay shut in crashes, and restraints such as air bags.

by Allan F. Williams
Insurance Inst. for Hwy. Safety, Watergate 600, Washington,
D.C. 20037
1978; 20p 39refs
Availability: Corporate author

HS-024 848

NEVADA'S MOTORCYCLE HELMET AND ACCIDENT ANALYSIS

To illustrate the effect of Nevada's mandatory motorcycle helmet law (promulgated 1 Jan 1972), motorcycle registrations, accidents, fatalities, and injuries are tabulated from 1970 through 1977. When the legislation went into effect, the legal motorcycle riding age was raised from 14 to 16. A second chart tabulates the percentages of motorcycle registrations, and of motorcycle involvement in total accidents, fatalities, and injuries. In 1976, 11.16% of all fatalities were caused by motorcycle accidents, compared to a low of 3.47% (1972) and 6.64% in 1977. For the 1970-1977 period, 84.97% of all motorcycle accidents involved death or injury, as opposed to 27.5% of all automobile accidents. A survey by the Office of Traffic Safety of 814 motorcyclists involved in accidents in 1977, with 384 (47%) responding, indicated that the helmet law was supported by 64.8% of the respondents. A public opinion poll of about 520 questionnaires issued to persons completing requirements for a driver's license indicated that 76.8% supported the mandatory helmet law. Various studies from 1960 through 1965 (before enactment of mandatory helmet laws) showed that up

to two-thirds of motorcycle fatalities resulted from head injuries. Studies comparing head injuries in Michigan (helmet law state) and Illinois (non-helmet law state) showed that compulsory helmet use reduced fatal or serious head injury by 63% and all types of head injury by 54%. The constitutionality of the Massachusetts motorcycle helmet law was upheld by the Federal District Court and affirmed by the Supreme Court. Idaho Traffic Safety Com. study of motorcycle accident victims revealed an overwhelming support for mandatory motorcycle helmet laws. Studies by the National Hwy. Traffic Safety Administration show that vision and hearing are only minimally restricted, although there is room for improvement in helmet design. Of the 22 states which have repealed or weakened their helmet laws, Kansas reports a 70% increase in head trauma, with incidence 81% greater for cyclists not wearing a helmet, and severity 56% greater. The crude death rate for cyclists not wearing a helmet was 310% greater than for helmet wearers. Figures from five states with repealed helmet laws (Washington, Oregon, Arizona, Colorado, and Minnesota) show an increase in fatalities of 50.6% between 1976 and 1978?; 6p 5refs

Availability: Reference copy only

HS-024 849

REAL OCTANE REQUIREMENT FOR SAFE OPERATION OF GASOLINE ENGINES

The results are reported of a work program conducted in Italy (1975-1976) by the C.U.N.A. Octane Requirement Working Group, aimed at establishing the "Real Octane Requirement" or the minimum Octane Number (O.N.) in Primary Reference Fuels (PRF) for a knock intensity which does not induce engine damage. Endurance bench tests were run by ESIO, FIAT, MOBIL, and SNAMPROGETTI-AGIP research laboratories at 4000 and 5000 rpm, full load, for 50-100 hours. The test load corresponded to a PRF of octane rating 2, 3, or 4 units lower than would cause audible trace knock, defined as "octane deficiency." Field tests were run with cars equipped with carburetors and brakes operating at constant speed. It was concluded that an octane deficiency of 2 O.N. does not cause engine damage. Six engines having passed the endurance test on this fuel. With an octane deficiency of 3 O.N., 20% of the engines were damaged, and an octane deficiency of 4 O.N. resulted in noticeable damage, such as breakage of piston lands and rings, cylinder head erosion, or piston crown breakage. It was also concluded that trace knock does not generate engine damage even if it is present continuously in an engine operated at full load and high speed; use of fuels with a motor octane number (MON) lower than 84 may incur engine damage, and use of fuel below 81 MON will certainly cause damage. The quality of gasoline which will produce detonation intensity capable of causing engine damage is significantly lower than the minimum quality specified in Italy for Premium grade. Within a range of 4 to 10 degrees ignition advance from plus four to minus four degrees relative to the value recommended by the engine builder, the variation of O.R. (Octane Requirement) at trace knock is on average 0.5 O.N. per crank angle degree. Since a change of up to 10 degrees ignition advance can occur under normal service, an octane deficiency of 2.5 O.N. can arise in an engine running on a gasoline that produces trace knock at nominal ignition setting. Therefore, the surplus O.N. of commercial gasoline

must make up for the inaccuracies of engine adjustments as well as for manufacturing tolerances.

by G. F. Zanoni

AGIP S.p.A., Italy

Rept. No. SAE-770810; 1977; 15p 16refs

Prepared on behalf of Commissione Tecnica di Unificazione nell'Autoveicolo (C.U.N.A.), the Italian Automotive Standard Commission. Presented at Passenger Car Meeting, Detroit, 26-30 Sep 1977.

Availability: SAE

HS-024 850

THE DASHBOARD KNEE INJURY

An in-depth study of 74 motor vehicle accidents involving 222 people revealed that 57 of the 153 people injured sustained 69 knee injuries from contact with the instrument panel. There were 51 mild, 10 moderate, and 8 severe knee injuries. Some of the injuries were suffered by persons wearing seatbelts (11 mild, 3 moderate, and 1 severe knee injuries). Low force contact caused bruising, and more serious injuries occurred when a greater magnitude of force was applied. Injury was most severe when this force was concentrated in a small area and caused lacerations, fractured patella, and open wounds of the joint. Legs trapped under the dashboard with simultaneous rotational, varus, valgus, or frontal forces by the inertial motion of the body produced serious injuries similar to those received in sports. Degenerative arthritis was more likely to occur in the seriously injured knees, but generally was not predictable. Long-term disability might be mitigated by early diagnosis and treatment of the specific injury. To prevent dashboard knee injuries, a broad deformable lower dashboard is recommended to prevent the right front passenger's knees from slipping underneath, and padding of the lower dashboard to provide protection against a second collision of the driver's knees against a rigid steering column support or a sharp object on the dashboard. It is also recommended that there be an appreciation of the mechanism of injury to facilitate early diagnosis and surgical correction of ligamentous injuries of the knee.

by Donald A. Nagel; David S. Burton; John Manning

Publ: Clinical Orthopaedics and Related Research n126 p203-8 (Jul-Aug 1977)

1977; 17refs

Supported by the National Hwy. Traffic Safety Administration

Availability: See publication

HS-024 851

ROAD ACCIDENTS--THEIR CAUSE AND PREVENTION, WITH PARTICULAR REFERENCE TO RHODESIA

The road accident rate in Rhodesia is much higher than that of other countries (37 per million vehicle miles; U.S. rate is 4.6 per million vehicle miles, lowest in the world). A study of the causes of traffic accidents is aimed at reducing this road accident rate. The effects of alcohol in the driver's blood on traffic accident incidence has been amply demonstrated, with increased incidence as blood alcohol rises. A proposed Rhodesian statutory maximum permissible blood alcohol concentration (BAC) is 80 mg %. An Australian study revealed that of 400 traffic fatalities, 60% of the drivers had positive BACs, and 50% had BACs of 100 mg % or more. Similar results were reported in accidents involving drivers and pedestrians, al-

cohol being present in one or both persons involved. Determination of BAC is not legally required in Rhodesia from drivers involved in traffic accidents. Under laboratory conditions, alcohol was found to cause release of inhibitions, causing the driver to overestimate his skills; to decrease awareness and to prolong reaction time to sensory stimuli, especially visual; to cause muscular incoordination; and to increase aggression. Many medical conditions cause a deterioration of the patient's standard of driving, most of these conditions not discovered during a licensing examination. Older drivers are most likely to become subject to degenerative diseases which impair their driving ability. One study revealed that the accident rate of unhealthy drivers was almost twice that of healthy drivers. Subjects suffering from psychosocial conditions had a higher accident rate than those with purely organic disease. Although little information is available on the effects of ill health on Rhodesian driver ability, one study revealed a 30% incidence of faulty vision among Rhodesian drivers, with incidence progressing according to age. Vision tests of all drivers are recommended.

by M. M. M. Hayes

Publ: Central African Journal of Medicine v23 n4 p71-3 (Apr 1977)

1977

Availability: See publication

HS-024 852

THE INCIDENCE OF CANNABINOIDS IN FATALLY INJURED DRIVERS: AN INVESTIGATION BY RADIOIMMUNOASSAY AND HIGH PRESSURE LIQUID CHROMATOGRAPHY [CANNABIS; MARIJUANA]

Radioimmunoassay of postmortem blood from 66 fatally injured British drivers showed cannabis (marijuana) use in six cases. Further examination was made of three of the specimens by a combined system of high-pressure liquid chromatography and radioimmunoassay; they showed typical patterns of separated cross-reacting cannabinoids and gave a specific measurement of tetrahydrocannabinol (THC) levels. The total cross-reacting cannabinoid levels in the positive samples were low compared with the levels detected in earlier cases of intoxication or in volunteers smoking moderate doses of pure THC. The 9% minimum apparent incidence of cannabis involvement may not be generally valid since the pathologists sending samples upon which the study was based might have selected those (young males) most likely to have been using cannabis. However, the blood levels of THC were moderate and if such levels are causing accidents, more research on effects of cannabis is needed.

by J. D. Teale; Jacqueline M. Clough; L. J. King; V. Marks; P. L. Williams; A. C. Moffat

Publ: Journal of Forensic Sciences v17 p177-83 (1977)

1977; 10refs

Availability: See publication

HS-024 853

ALCOHOLISM AND CORRELATES OF MORTALITY: IMPLICATIONS FOR EPIDEMIOLOGY

As part of a series of follow-up reports on 935 alcoholics discharged from a British hospital from 1 Jan 1953 to 31 Dec

1957, the correlates of mortality due to alcoholism are identified and their significance to epidemiology are discussed. The ratios of observed to expected mortality show no consistent relationship between social class and mortality, although there were a number of social-class differences in causes of death: the upper classes had higher incidences of cancer (I, II, and III) and diseases of the digestive system (I and II); the middle class (III) had highest incidence of disease of the nervous system; and the lower classes (IV and V) had the highest ratio of deaths due to respiratory disease. Deaths by accident, violence, and suicide did not show a consistent relationship to social class. Hospital diagnoses at the patients' discharge were coded and tabulated against the probability of death during the follow-up period, during which 30.9% actually died. It was found that diagnosis of any physical condition almost doubled the probability of death. Social-class differences in mortality vary greatly over the course of the years, and vary within class for age, sex, and marital status. When correction is made for differences in base estimates of expected deaths, alcoholism has a differential impact on mortality expectation according to grouping by social class; alcoholism is likely to increase the risk of death more in social classes I and II than in IV and V. The present results suggest that in some circumstances there may not be a fixed relationship between the prevalence of alcohol and alcohol-related mortality, due to economic and social influences on drinking. Shifts in the way alcoholics within particular classes drink may lead to an unstable relationship between social class and alcoholism. The present results also indicate the need to investigate the nature of the processes which make alcoholism more deadly for the economically more privileged classes. The drinking patterns of alcoholics of different social classes could be compared, such as the total quantity drunk and the patterns of intake. Reliable interview methods are lacking for eliciting this information. It is possible that the economically more privileged classes are at a disadvantage if they are protected from the social consequences of alcoholism until the condition is farther advanced. The impact of drinking on the factors which normally give the economically privileged a health advantage could be studied: such factors as nutrition, medical care, and general aspects of family and social support.

by Griffith Edwards; Elspeth Kyle; Peter Nicholls; Colin Taylor
 Publ: Journal of Studies on Alcohol v39 n9 p1607-17 (1978)
 1978; 39refs
 Availability: See publication

HS-024 854

MODERN PLASTICS FOR THE AUTOMOTIVE ENGINEER

Recent changes in the automotive industry for cost and weight reduction have featured the increased use of plastics, particularly engineering thermoplastics. Constraints brought about by the fuel crisis and safety standards such as flammability protection have led to a more rational multifunctional design approach for the purposes of general safety, comfort and luxury, styling, and easy care and maintenance. Polymers are characterized by such parameters as ultimate use temperature, mechanical properties (dimensional stability and impact resistance), chemical resistance, and aging behavior. Processibility is a continuous concern to the plastics producer, toward which improvements are sought in flow properties and such technical possibilities as the application of Hot runner systems, structural foam moulding, or coextrusion. Scratch re-

sistant coatings for plastics are being developed, leading to the possibility of plastic head lamps for weight saving and design freedom; these lamps will probably be made of polycarbonate. Bumper systems are being tested, made of soft foam or solid elastomers or of more rigid and ductile material. Developments are in progress for making complete rear door assemblies, truck cabs, and public service vehicle interiors. One of the largest mouldings produced so far is the complete roof and top-side of the American Motors Corp. CJ7 Jeep, made of Lexan polycarbonate Structural Foam, measuring over 2m long and weighing 36 kg.

by J. Bussink; M. H. Radley
 General Electric Plastics B.V., Bergen op Zoom, Netherlands
 Rept. No. N78-25203; S.138; 1978?; 21p
 Presented at South African Conference (1st) on Plastics in the Service of Man.
 Availability: NTIS

HS-024 855

THE NATIONAL DRIVER REGISTER, A VALUABLE LICENSING TOOL THAT NEEDS TO BE IMPROVED

The General Accounting Office (GAO) review of the National Driver Register (NDR) finds that the data are inconsistent, sometimes incomplete, and not regularly updated. The GAO states that the NDR has not been evaluated by the National Hwy. Traffic Safety Administration (NHTSA) in terms of the objectives intended by Congress, or in terms of users' needs and possible changes. States do not always submit the type of information requested by NHTSA (i.e. when suspended driving privileges can be or have been restored). The states also use the register differently. Reasons for not supplying or acquiring NDR information include state legal restrictions (privacy laws), insufficient accurate data at NDR, delayed response, processing too costly, and availability from other sources. There is need for a comprehensive evaluation of NDR, since the present system does not adequately accomplish the intended goals and purposes, particularly that of helping to prevent states from licensing individuals whose driving privileges have been suspended or revoked in other states. GAO recognizes that participation in NDR is voluntary. Nevertheless, GAO directs that an evaluation of the NDR system be made to determine how much the system is used and how it can be improved. It is recommended that instructions and guidance be issued to the states, such as descriptions of the data needed to improve the system and information on how often to send it. NHTSA has indicated that an NDR system review is planned, as well as a rapid response demonstration, to be developed in 1981.

by Henry Eschwege
 General Accounting Office, Washington, D.C. 20548
 Rept. No. PB-283 116; CED-78-129; 1978; 10p
 Report is in the form of a letter to Brock Adams, Secretary of Transportation.
 Availability: NTIS

HS-024 856

A STUDY OF FUTURE HEAT ENGINE VEHICLE SYSTEMS. FINAL REPORT

Using vehicles which are extensions of present heat-engine technology and not storage systems or hybrid power, a projection has been made of the characteristics of future passenger

highway vehicles through the year 2000 in the U.S. The change in fuel economy, incremental change in consumer cost, total vehicle weight by vehicle size, and most likely technical improvements have been projected for 2-, 4-, 5-, and 6-passenger vehicles, and multipurpose vehicles for the time periods 1980-1982, 1985-1990, and 1990-2000, with the present (1977) as a baseline. It has been concluded that further substantial fuel economy gains will be made for all makes of vehicles through the year 2000. These gains are possible with relatively low technical risk until the years 1990-2000. Gains made during the 1990-200 period will result through engineering development rather than through different and alternative heat engines, and will be addressed to optimizing combustion and mechanical-equipment technology. Alternative engines will not become practical production units until the 1990-2000 period and then only if there is a marked advantage over current heat engines in petroleum fuel savings. The net estimated incremental consumer costs for producing fuel-efficient vehicles, including modifications to meet safety standards for crashworthiness and crash avoidance, will result in a total saving to the owner. The cost for improvements will not be a deterrent to their introduction. The smaller class vehicle with lower performance will likely be acceptable to the consumer in the 1985-2000 period due to marketing pressures from industry and higher costs for fuel. Regulatory measures for emissions, safety, and noise will not prevent the attainment of fuel economy gains.

by Donald A. Hurter
 Authur D. Little, Inc.
 W-7405-ENG-48
 Rept. No. UCRL-13781; 1977; 32p 20refs
 Prepared for Univ. of California, Lawrence Livermore Lab.
 Availability: Corporate author

HS-024 857

MEASURING DRIVER PERFORMANCE: INSTRUMENTATION, SOFTWARE, AND APPLICATION

A data collection and analysis system is presented for an instrumented car research program to measure driver performance, with particular emphasis on the alcohol-impaired driver. Transducers, electronic circuitry, and data recording are described, and data analysis procedures are indicated. The original instrumentation package includes eight transducers which measure brake pressure, brake pedal position, accelerator pedal position, lateral acceleration, longitudinal acceleration, speed, and steering wheel position (fine and coarse). Research is underway with an instrumented car to measure performance of alcohol-impaired drivers on test tracks; it is designed to study the influence of alcohol and its interaction with environmental variables such as roadway curve characteristics and lane width, situational variables such as lighting conditions and stopping distances, and driver characteristics such as personality differences and drinking experience. The system has proven to be reasonably robust and adaptable to various experimental conditions. The modular concept of electronic circuitry has allowed continued data collection during malfunctions in specific transducers or circuitry. Since the system was designed, the reduced cost and increased availability of microcomputer hardware have made it feasible to circumvent most of the problems encountered in data reduction (i.e. in-vehicle A/D (analog-to-digital) conversion and transmis-

sion to the analytical computer requiring considerable time and perfectly-functioning equipment).

by David K. Damkot; Henry A. Geller; David G. Whitmore
 University of Vermont
 PHS-RO1-00697-02
 Rept. No. SAE-770813; 1977; 9p 2refs
 Presented at Passenger Car Meeting, Detroit, 26-30 Sep 1977.
 Availability: SAE

HS-024 858

YOU GO IN SNOW [SNOW TIRES]

Various approaches taken by U.S. manufacturers in developing studless tires for use in snow are discussed. High-traction rubber compounds and all-season tires are replacing the studded tire, banned in many states. The tire engineer has to estimate the percentage of time the tire will be operating in ice, snow, slush, rain, and dry conditions, and to plan his product accordingly. Tire traction under various conditions depends on tire construction, tread pattern, and tread rubber composition. High traction rubber compounds were developed in Europe for "hydrophilic" tires in which the traditional carbon black was replaced by such materials as silica-based compounds. American technology augmented hydrophilic compounds with formulations that kept tire rubber flexible at low temperatures. Other tire characteristics to be considered for snow tires include stretchability and flexibility, sufficient hardness to prevent distortion, low heat generation, chip, tear and crack resistance, ease in manufacturing, good tread wear, low noise and corner squeal, good dry pavement traction, high speed endurance, and durability beyond one tread life. Another factor affecting snow tire performance is aspect ratio. The lower, wider tires in a given size have a greater traction area, and sink less into the snow than higher aspect ratio tires, so that the snow tends to pack underneath, providing a firmer traction base. Tire manufacturers place different emphasis on the various tire elements affecting traction. Radial tires are considered superior for high traction, due to their greater sidewall flexibility, ground gripping quality, and relatively quiet operation (allowing more latitude in tread design). Small, thin slots (sipes) across the tread area improve performance on wet roads. Tread rubber formulas vary among manufacturers; some add silica, some emphasize low temperature flexibility, some strive for high hysteresis (damping quality). All-season tires, introduced in 1968 by B.F. Goodrich, have had renewed success since the introduction of radial tires. This type of tire should work well except in heavy snow belt areas. Winter tire tips, selling tips for the snow tire dealer, and profiles of snow tire treads (Goodyear, Firestone, General, Kelly-Springfield, Cooper, and B.F. Goodrich) are included in separate notes.

by Cliff Gromer
 Publ: Motor v150 n5 p43-6, 63 (Nov 1978)
 1978
 Availability: See publication

HS-024 859

ADULT PEDESTRIAN SAFETY EDUCATOR'S GUIDE

This guide presents a suggested organization for the use of materials for an adult pedestrian traffic safety education program, and gives the educator, in substantial detail, a feel for and background in adult pedestrian traffic safety. The guide consists of 22 flip charts (divided among four sessions, each of

about 15 minutes' duration) which deal with the following traffic safety points: eight critical areas isolated, the size of the problem, New Jersey pedestrian fatalities, attitudes, bus stop related, physical effects of advancing years, the intersection dash, unawareness of existing hazards, "walk" pedestrian signal conflict, exceptional pedestrians, vehicle turn-attention conflict, multiple threat, vendor--ice cream truck, other types of pedestrian accidents, the driver and the nondriver, backing up, darkness and weather, the shopper, the jaywalker and dart out, ingested alcohol and medicine, the "rap" up (summary). Suggested discussion questions are included for each flip chart. The materials provide a comprehensive, participatory, flexible program that is easy to conduct by either a professional or a nonprofessional educator; generate enthusiasm among members and educators for traffic safety education in the pedestrian area; initiate and augment the acquisition of concepts, skills, and values basic to the safe use of streets and roadways; and educate the adult pedestrian in safe walking habits that will reduce the probability of being injured or killed in the traffic system.

New Jersey Dept. of Education, Educational Improvement Center-South
1977?; 49p

Sponsored by New Jersey Div. of Motor Vehicles.

Availability: New Jersey Div. of Motor Vehicles, Office of Hwy. Safety, 4 Scotch Rd., Trenton, N.J. 08628

HS-024 860

NEW JERSEY'S ENDANGERED SPECIES..."PEDESTRIAN EXITILIUS" [PEDESTRIAN TRAFFIC SAFETY]

An overview is provided of the adult pedestrian safety problem in the State of New Jersey, with recommended solutions. During 1975 and 1976, N.J. experienced 531 pedestrian fatalities out of 2126 highway fatalities. Half of the pedestrian fatalities occurred between 5 PM and 11 PM. Of all pedestrians killed, 71% were crossing a roadway, 9% walking with traffic, 5% standing in the road, 4% coming from between parked cars. During this same period, there were 13,791 injured pedestrians. The 9-year old and younger and the 65 and over age groups suffered the most and the severest injuries. Most injuries (63%) took place between 12 noon and 7 PM. Of pedestrians injured, 34% were entering the roadway at signals, 32% entering the roadway not at an intersection, 11% entering from behind a parked vehicle, 3% playing in road, and 3% walking with traffic. The probability of an older pedestrian being killed in a traffic accident is at least seven times greater than that for school-age children, due to the oldsters' impaired vision and hearing, and slower reactions. Suggested solutions to increase safety for older pedestrians include longer traffic signal intervals, more refuge islands, lower curbs, greater enforcement of right-of-way to pedestrians using crosswalk, better roadway lighting, and more educational programs. Countermeasures to be taken by older pedestrians pertain to the basic safety rules, caution, and alertness.

New Jersey Dept. of Law and Public Safety, Office of Hwy. Safety, 4 Scotch Rd., Trenton, N.J. 08628
1977?; 2p

At head of title: "Our business--making traffic safety a reality".

Availability: Corporate author

HS-024 861

SCHOOL CROSSING GUARDS: GIVING YOU DIRECTION, AND YOUR CHILDREN PROTECTION

The school crossing guard program jointly administered by the California Hwy. Patrol (CHP) within each county is described, in the context of a discussion with the Pupil Safety Officer of the Santa Fe Springs CHP, who has the responsibility for securing, training, and supervising 43 crossing guards in the seven school districts within his jurisdiction. Screening of applicants, the training session, the crossing guard manual, the conduct rules for children, the guard's responsibilities, and emergency rules are explained.

by Barbara Burks

Publ: California Highway Patrolman v42 n10 p12-3, 45-7, 49
(Dec 1978)

1978

Availability: See publication

HS-024 862

THE NEED FOR SAFER CARS

Examples are cited of how the actions of governmental agencies (most notably the National Hwy. Traffic Safety Administration), legal judgments, and consumer groups have variously resulted in the investigation, recall, and/or modification of defective American cars. Cases are described involving the fuel tank rupture and explosion of Ford Pintos and Chevrolet Chevelles; mechanical defects in the Chevrolet Corvair; leaking fuel tanks in Plymouth Horizons and Dodge Omnis; malfunction of automatic transmissions (jumping from park into reverse) of 1973-1978 Ford cars and trucks; fuel line problems in 1975 and 1976 model Ford Granadas equipped with V-8 engines; steering malfunctions in 1973-1975 Ford Pintos, Mustang II's, and Mercury Bobcats; stalling problems of Dodge Darts and Aspens, and Plymouth Volares and Valiants (1975-1977 models); power brake booster failures on 1976 GM Chevrolets, Pontiacs, Oldsmobiles, Buicks and GMC trucks; engine cooling fan problems on 1972, 1976, and 1977 Fords, Mercurys, and Lincolns; faulty gas caps on 1970-1977 Honda motorcycles; defects in 1975 and 1976 VW Rabbits and Sciroccos causing steering control loss and accelerator sticking; and defects in pollution control systems (excess of nitrogen oxides) of AMC cars and trucks. The chairman of the Federal Trade Commission has stated that an American consumer is more than four times as likely to have a problem with his car than with any other product he might purchase. Getting corrective action is often a slow process.

by William L. Roper

Publ: California Highway Patrolman v42 10, p19, 67, 70, 73, 76
(Dec 1978)

1978; 3refs
At head of title: Governmental agencies, legal judgments and consumer groups demand
Availability: See publication

HS-024 863

SURPRISING COMEBACK. STEEL [AUTO INDUSTRY]

A primary finding of a survey of nine major steel suppliers to the U.S. auto industry is that more steel is being used in automobiles. The steel industry has been dealt a serious blow

because of vehicle weight reductions made in order to meet fuel economy standards. Automakers have been strongly motivated to look for lighter weight replacements (e.g. aluminum, plastics) for steel, which traditionally has composed 60% of the car. Steel officials are extremely optimistic about the future of their product in the automobile for a variety of reasons. Among these are the increasing availability of new steel alloys that are stronger and lighter, a new cooperative attitude of the auto companies, the uncovering of several new methods of fabricating steel so that it is both stronger and lighter, innovation at some steel companies where lighter steel components have been designed, and because of large price increases by the aluminum companies. The big development is the arrival of numerous high strength, low alloy (HSLA) steels which are 1.5 to 3 times stronger than the present steels and which permit a 15% to 25% weight reduction. Some of this steel already is being used, but it is predicted that HSLA steel will represent 30% to 35% of the typical car in 1985 (when the 27.5 mpg fuel economy standard must be achieved). Contributing importantly in this area is a unique dual-phase steel that has good formability when it goes into the stamping press and then picks up considerable yield strength when it is stressed or worked in the die, rising from an initial 50,000 to 75,000 or 80,000 psi during the stamping. Auto and steel industry representatives provide comments on developments in the steel-car relationship, emphasizing the recent cooperation between the steel and auto industries. Indicative are announced plans by Ford Motor Co. to use more high strength steel: for example, to replace aluminum bumpers on 1981 Fairmont, Zephyr, Granada, Monarch, Cougar, and Thunderbird with high strength steel bumpers. General Motors (GM) will soon use 170 lb of high strength steel, up from 50 lb, and plans to use dual-phase steel wheels on many 1980 GM cars. Chrysler advertises use of high strength steel for Omni and Horizon hoods, doors, and deck lids.

by Joseph M. Callahan

Publ: Automotive Industries v158 n17 p59-66 (Dec 1978)
1978

Availability: See publication

HS-024 864

SAVING WEIGHT: A DESIGN EXERCISE IN GLASS [SAFETY GLASS USE IN A NEW AUTOMOBILE DESIGN]

Triplex Safety Glass (Birmingham, England) has announced a new "super laminated" windshield which offers weight savings, design flexibility, and improved safety. Ogle Design (Letchworth, England) was commissioned to produce a design exercise exhibiting production capabilities of Triplex 10-20 glass. Ogle took a standard Princess 2200 car and modified it into what is known as the 10-20 Glassback. Car designers often have complained that glass is heavier than sheet metal, and using glass usually increases weight above the center of gravity, which hinders handling. However, Triplex 10-20 is thin, toughened glass of good optical quality. The sunroof panel of the Glassback is only 0.09 in (2.3 mm) thick, the rear roof panel and side door windows are 0.12 in (3 mm), the rear quarterlights are 0.15 (4 mm), and the tailgate is 0.20 in (5 mm). The sunroof panel is so thin that it is flexible. Instead of sliding open in the normal fashion, it is pushed up at the center of the trailing edge opening to a gap of 1.2 in (30 mm). Because the Glassback has over 50% more glass area than the standard Princess, all the glass is green-tinted Sundym which absorbs a high proportion of ultraviolet and infrared rays. A

colorless metal oxide compound, "Hyviz", developed for aerospace use, is processed into the windshield. Hyviz is an electro-conducting film which acts as a radio antenna, defroster, or defogger, controlled by a 3-position switch. Other possible applications of Hyviz include an invisible burglar alarm, a screen against microwave radiation, or as heat insulation. Processing of Triplex safety glass is described.

by John McElroy

Publ: Automotive Industries v158 n17 p69-70 (Dec 1978)
1978

Availability: See publication

HS-024 865

INVESTIGATION OF TIRE-PAVEMENT INTERACTION DURING MANEUVERING. VOL. 1. THEORY AND RESULTS. FINAL REPORT

The analytical model for a single tire and its interaction with the pavement is described. The model was developed for the purpose of calculating the tire-pavement shear force data needed by existing computer programs for the analysis of vehicle handling performance. The project to develop this model proceeded in two major areas of research which were the analysis of the tire structure, and the analysis of rubber-pavement friction. The tire structural analysis, necessary to obtain the tire-pavement contact pressure and shear force distributions, was obtained by the construction of a finite-element tire model which is described. The contact analysis, utilizing theoretical or experimental values of the friction coefficient as a function of local contact pressure and sliding speed, is presented. Prediction of rubber friction was achieved with the development of a viscoelastic theory of friction. This theory, which includes friction phenomena attributed to adhesion as well as deformation, is developed. An efficient numerical method, based on the fast Fourier transform, for solving the friction equations is described. A comparison of the friction theory predictions with experimental results is provided. The end result is a package of computer programs (TIRE ANALYSIS PROGRAM PACKAGE in Vols. 2 and 3) that implements the single tire model. These programs provide, for the first time, the capability for calculating the influence of tire construction and pavement frictional characteristics on the tire-pavement shear forces generated in response to the major tire operating variables.

by R. A. Schapery; J. T. Tielking

Texas A and M Univ., College Station, Tex. 77843
DOT-FH-11-8268

Rept. No. FHWA-RD-78-72; MM-3043-77-2; 1977; 255p refs
Rept. for Feb 1974-Jun 1977. Vols. 2 and 3 (Computer Program Manual, FHWA-RD-78-102, and User's Manual, FHWA-RD-78-103) will not be published, but are available through NTIS.
Availability: NTIS

HS-024 866

DILEMMA IN DETROIT [AUTO INDUSTRY, MARKETING AND GOVERNMENT REGULATION]

Top U.S. automotive executives describe the problem of marketing to meet the law as the industry faces governmental regulation. The automaker is faced with the dilemma of trying to produce automobiles that will conform to the relatively new and rigorous government standards while achieving public appeal. In the mid-1960's, the control of exhaust emissions

became a matter for societal consideration, and the government issued emissions regulations. The public became more aware of safety factors for preventing automobile accidents and minimizing damage when accidents occurred. By 1965, it was no longer enough to engineer a car soundly and make it attractive enough to sell both in price and in appearance; legislation affected how these tasks were done. In the mid-1960's when the government decided to exert more control over automobile and highway safety, legislation was passed to put the auto industry under more control than in the past, partly by imposing uniform safety standards. Major regulations governing the auto industry today are those covering the emissions of hydrocarbons, carbon monoxide, and nitrogen oxides, and those setting fuel economy standards. The auto industry states that it is responding to social needs as best it can.

by Frederic A. Birmingham
 Publ: Saturday Evening Post p54-6, 130, 136 (Nov 1978)
 1978; 1ref
 Availability: See publication

HS-024 867

EVALUATION OF TWO DRIVER IMPROVEMENT GROUP INTERVIEW PROGRAMS: SECOND INTERVIEW

The relative effectiveness was assessed of three treatment conditions administered by the Washington State Dept. of Motor Vehicles' Driver Improvement Div.: a nontreatment, or control, condition (NT), a Standard Second Group Interview (SI), and a Modified Second Group Interview (MI). Testing for the statistical significance of group differences was performed for each of the following items: proportions of drivers suspended during the post-treatment year, proportions of drivers who accumulated record entries following treatment (citation and accident entries assessed separately), the average time lapse between treatment and the occurrence date of a subsequent citation or accident, and the changes in citation and accident accumulation rates between the year prior to selection and the year subsequent to treatment (for those drivers not under suspension in either 12-month period). Each of the three treatment conditions was administered to a separate group of 168 male drivers who, having been placed previously under a six-month surveillance following a SI, failed to complete that surveillance period without committing one or more moving violations. The drivers of the MI sample attended a semi-structured, interactive meeting with a Driver Improvement Analyst and a maximum of 12 other First Group failures, as did the SI group, but they were not informed as was the SI group of their placement under a six-month probation period and were not instructed about the consequences of further citation accumulation, insofar as possible. There was no difference among the three groups in proportion of drivers suspended during the post-treatment year. While neither the MI or SI group proportion of accident failures differed significantly from that of the NT group, both had significantly lower proportions of citation failures. The citation failures rate for the SI group decreased after 90 days and continued to decrease during the year; the MI citation failure rate did not decrease significantly until the end of the year. Each treatment group averaged significantly fewer citations and fewer accidents during the post-treatment year than in the pre-selection year, but the SI group's rate of reduction in citations accumu-

lated by driver was significantly greater than that of the NT group.

by Peggy Ann O'Neill
 Washington Dept. of Motor Vehicles, Res. and Technology
 Div., Olympia, Wash. 98504
 Rept. No. Washington-DMV-040; 1976; 38p 1ref
 Availability: Corporate author

HS-024 868

MEDIAN LIFE OF PASSENGER CARS IN SWEDEN 1977

Statistics are presented on the age of the Swedish passenger car population in 1977, compared to previous years. A graph shows the median life of the car populations in the U.S. and in Sweden for the years 1963 through 1977. The median life for some major car makes in the Swedish market (BMC, BMW, Citroen, DKW/Audi, Fiat, Ford, Mercedes-Benz, Opel, Peugeot, Renault, SAAB, Simca, Vauxhall, Volkswagen, Volvo) is tabulated for the years 1965, 1971, 1975, 1976, and 1977. The median life varies considerably among different makes. The car makes with the lowest values (11.0, Fiat; 11.2, Simca; 11.5, Vauxhall; 11.6, Peugeot) had more than three years shorter median life than the average car and 6 to 7 years shorter than the highest value (17.5, Volvo). A table lists the percentages that remain at the end of 1977 of the originally-registered passenger cars of model years 1960, 1965, and 1970 for the major car makes. After about 17 years 17.9% of the originally-registered passenger cars still remain, but there are great variations among the different makes. The remaining percentages of the 1960 models vary from 2.7 (Simca) up to 29.9 (Volvo).

Aktiebolaget Svensk Bilprovning, Fack, S-162 10 Vallingby, Sweden
 1978; 3p
 Availability: Corporate author

HS-024 869

WEAK POINTS OF CARS. PERIODIC INSPECTIONS DURING 1978. SEPARATE ACCOUNT OF THE FAULTS IN PASSENGER CARS OF THE 1970, 1974 AND 1976 MODELS [SWEDEN]

Statistics on motor vehicle defects are presented, derived from data collected during 1978 periodic motor vehicle inspection in Sweden. The annual inspection applies to all registered motor vehicles and trailers, two years old or older. The information consists mainly of relative observation frequencies and percentages of defects for different main systems and subsystems and for different kinds of vehicles. General results are presented for all motor vehicles and for passenger cars, with data from previous inspections included for comparison. The major portion of the statistics consists of data on passenger cars by make for the 1970, 1974, and 1976 model years. Makes include Alfa Romeo, Audi, Austin, Autobianchi, BMW, Citroen, DAF, Datsun, Fiat, Ford, Honda, Mazda, Mercedes-Benz, Opel, Peugeot, Renault, SAAB, Simca, Toyota, VAZ, Volkswagen, and Volvo. Appended is a tabulation of defect frequencies for main systems and subsystems/components for the model years 1960 through 1976.

Aktiebolaget Svensk Bilprovning, Fack, S-162 10 Vallingby, Sweden
 1979; 147p
 Availability: Corporate author

Aug 31, 1979

HS-024 873

HS-024 870

DISC BRAKE CALIPER OVERHAUL, STEP-BY-STEP

Instructions are provided to the mechanic for careful inspection of disc brake calipers during brake servicing, spotting caliper problems, and correcting them. Step-by-step procedures are described and illustrated for a disc brake caliper overhaul once a frozen, dragging, or leaking caliper has been discovered during the inspection process. Overhauling U.S.-made, single-piston disc brake calipers involves the following eight steps: set a wooden block where the outboard pad should be and use the air gun to pop piston out of caliper; on AMC, Chrysler, and Ford products, carefully lift the dust boot out with your fingers; on GM Delco Moraine, use a screwdriver to free metal ring in dust boot holding it to caliper bore groove; check new square cut seat for distortion or tearing and coat with brake fluid and install in clean groove; install the square cut seal into the groove making sure that it seats evenly all around the caliper bore; for AMC, Chrysler, and Ford products, put dust boots over the solid end of piston with larger end of boot facing piston's solid end; for AMC, Chrysler, and Ford products, press the dust boot into place with the tips of fingers; and use rocking motion to slide piston past square cut seal and seat dust boot on AMC, Chrysler, and Ford products. The job should be completed with a road test. A separate note provides instructions for piston popping.

by Bob Cerullo

Publ: Motor v150 n6 p27-30, 32-3 (Dec 1978)
1978

At head of title: How-To.

Availability: See publication

HS-024 871

BOSS THREADS [REPAIR OF FASTENER THREADS, AUTOMOTIVE APPLICATIONS]

A method is described for repairing automotive fastener threads that have stripped either from corrosion, wear, or overtightening. The basic idea involves installing a new thread of the same size as the old thread. This is accomplished through the use of Heli-Coil thread repair inserts which are precision-formed thread liners made of diamond-shaped, coiled 18-8 stainless steel wire. A few other companies market a similar product, but Heli-Coil, the original company (founded in 1947) making the inserts, is the leader in the field. The insert looks like a tightly wound spring and is larger than the hole into which it will be installed. When installing a thread insert into an engine block or similar application, the damaged or stripped threads first are drilled out using the drill size as specified on the Heli-Coil pack or kit. In the Heli-Coil pack, along with the insert, there is a tap that must be carefully run through the hole to create a seat for the insert. There is also an installation tool onto which the insert is screwed until the driving tang located at the bottom of the insert is fully engaged in the slot on the installation tool. Inside the hole, the twisting of the tang actually reduces the size of the insert permitting it to screw easily into the newly threaded hole. As the installation tool is screwed out, the insert expands to fit tightly into the threads. The standard type of installation tool is used for installing most coarse threads. A prewinder attachment is available for some coarse, all fine, and spark plug size inserts. The final step is to remove the tang, accomplished by positioning the square end of a punch on the notch at the end of the tang. When the tang is struck sharply with a hammer, it will break off at the notch. The final product is stronger than the

original thread. The inserts are particularly useful for aluminum applications. Installing spark plug hole thread inserts is even easier in that no drilling is involved. Another available product, Nutserts, used to repair sheet metal screw threads, are described in a separate note.

by Bob Cerullo

Publ: Motor v150 n6 p35-8 (Dec 1978)
1978

Availability: See publication

HS-024 872

ROCHESTER QUADRAJET 4-BARREL [CARBURETOR SERVICING]

The step-by-step procedures for servicing General Motors' Rochester Quadrajets 4-barrel carburetor, the M4MC, are presented. The M4MC, designed specifically to improve fuel economy and driveability, is a two-stage unit of downdraft design, incorporating a triple venturi with small 1 3/8-in primary bores. The primary stage of the Quadrajets is the same as the single-stage, 2-barrel M2MC, which has small-car application. The secondary side of the Quadrajets has only a metering system, which supplements the primary main metering system when additional fuel is required by the engine. The six basic systems in the M4MC primary side are illustrated and directions given for their servicing; these systems are the float, the idle, the main metering, the power piston, the accelerator pump, and the choke.

by John Samanich

Publ: Motor v150 n6 p63-6 (Dec 1978)
1978

At head of title: Carburetor Series.

Availability: See publication

HS-024 873

PASSIVE CONTROL AT RAIL-HIGHWAY GRADE CROSSINGS. FINAL REPORT

Two combinations of experimental advance warning and crossing signs were developed and evaluated for use at passively-controlled rail-highway grade crossings. Each combination was installed at three sites. New conventional signing was installed at four additional sites. "Before" and "after" studies measured the effectiveness of two control changes: "as is" conventional to upgraded conventional, and upgraded conventional to experimental. Effectiveness was measured using motorist interviews, observed brake light applications, and spot speed studies. It was found that motorist awareness of the grade crossings increased in the "after" studies at five out of six sites where experimental control was implemented. Awareness also increased at three out of four sites where control was upgraded. The most significant aspect of change in motorist response was found at the experimental sites where the after studies showed a significant increase in "signing" (either advance or crossbuck) as the reason for awareness. Five out of the six increases were statistically significant at a 95% confidence level. One combination tested using brilliant yellow green Scotchlite as a background was found to be more noticeable than the second combination which had a yellow Scotchlite background. Standard deviations in spot speeds decreased at all but one crossing in the "after" studies. Average spot speeds in the "after" study increased at all but

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one site. The percentage of motorists observed to apply brakes increased at all sites for which data were available.

by Ivan N. Dommasch; Richard L. Hollinger; E. F. Reilly
New Jersey Dept. of Transportation, Div. of Res. and Devel.,
P.O. Box 101, Trenton, N.J. 08625
Rept. No. NJDOT-77-010-7707; HPR-Study-7707; 1976; 75p
4refs
Prepared in cooperation with Federal Hwy. Administration.
Availability: Corporate author

HS-024 874

ROAD OCTANE NUMBER TRENDS OF JAPANESE PASSENGER CARS

To develop empirical road octane number (RdON) prediction equations and to obtain information on the relationship between high-speed RON (research octane number) and fuel quality in Japanese cars, RON was determined by the Modified Uniontown Technique (MUT) and the Modified Borderline Technique (MBL) using five popular 1974 and 1975 model year Japanese passenger cars with manual transmissions and displacements ranging from 1200 cc to 2000 cc. Testing was carried out on a chassis dynamometer under full-throttle conditions. RdON-MUT was more affected by RON and DON than by MON (motor octane number). Hydrocarbon types measured as aromatics and olefins had barely any effect on RON. RdON-MBL measured at 1000 rpm and 2000 rpm was similar to RdON-MUT. Simple regression equations of RON or DON give satisfactory regression coefficients at high confidence level. RdON-MBL measured at 3000 rpm and 4000 rpm was more affected by MON and olefin content. The most favorable prediction equation is a linear equation of RON, MON, and olefin content. For predicting RdON depreciation, it is proper to use sensitivity or olefin content as a parameter. The importance of RON or MON for predicting RdON-MUT is different from that of U.S. model passenger cars with automatic transmissions in that the influence of MON is almost negligible. RdON at high speed (4000 rpm) correlated with olefin content or MON (i.e. sensitivity), and changed linearly with these variables. The all-car average RdON of a fuel containing 20 vol% olefin was 1.8 octane units less than a fuel without olefins. In the same manner, the change in the sensitivity from 8.0 to 10.0 caused a RdON difference of about 2.2 units. Olefin is the better predictor for RdON at high speed than MON for fuels of the same RON level.

by K. Date; T. Nishizaki; T. Maeda
Nippon Mining Co., Ltd., Japan
Rept. No. SAE-770811; 1977; 20p 23refs
Presented at Passenger Car Meeting, Detroit, 26-30 Sep 1977.
Research conducted in cooperation with Kyodo Oil Co.
Availability: SAE

HS-024 875

WHY JOHNNY CAN'T DRIVE. TEACHING THE UNTEACHABLE

Despite the consistent increase in enrollment in high school driver education courses, research studies over the past ten years have indicated that driver education has a minimal effect on the crash involvement of driver-education graduates. Studies in the late 1960's revealed that the determining factor in traffic accidents was not driver training itself but rather the nature of the student who enrolled in the driver education courses. Compared with nongraduates, driver-ed students

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tended to drive less. Further research in the 1970's, using statistical techniques to bring extraneous factors under control, indicated that there was only a very weak causal relationship between driver education and reduced fatalities for young women, and no relationship for young men. To examine the situation further, the National Hwy. Traffic Safety Administration (NHTSA) is conducting a \$1.2 million experiment in DeKalb County, Georgia, using a state-of-the-art driver-education curriculum. One randomly-selected group of students is being given training, while another is not. The modest goal of NHTSA, with the results expected in three or four years, is to demonstrate only a 10% to 15% reduction in "the probability of crash involvement" for driver-ed graduates. A statistical study completed by the Insurance Inst. of Hwy. Safety a year ago maintained that, to a definable extent, the presence of driver education in high schools encourages students under 18 to get licenses, and that, as a result, some 2000 16- and 17-year-olds die in car crashes every year. A covariance analysis as used in these statistical studies, does not prove causality; it merely suggests it. Causality can work both ways: driver education causes young people to be licensed, and licensing causes them to be offered driver education. Not issuing licenses until age 18 would be the cleanest solution to the youth accident problem. Other possibilities, although politically difficult to legislate or enforce, would include conditional, probationary, and curfew licenses. A 1970 study of driver education in Michigan showed an impressively high correlation between young men's driving records and those of their fathers. In view of the power of this role model, it must be accepted that there is really very little that can be done to improve driver education.

by David Abrahamson
Publ: Car and Driver v24 n7 p68-72 (Jan 1979)
1979
Availability: See publication

HS-024 876

IMPROVING TRANSPORTATION SERVICES FOR THE ELDERLY, THE HANDICAPPED, AND THE DISADVANTAGED

Seven papers discuss the transportation situation of elderly, handicapped, and disadvantaged persons in the U.S. Subjects include the following: lifestyles and transportation patterns of the elderly in Los Angeles, evaluation of Pennsylvania's free transit program for senior citizens, improving the mobility of the elderly and the handicapped through user-side subsidies, transportation for the elderly and the handicapped in San Diego, coordination and integration of special transportation services for the transportation disadvantaged (Ingham, Eaton, and Clinton counties, Michigan), costs of alternative transportation systems for the elderly and the handicapped in small urban areas (18 special transportation systems across the U.S.), and estimation of demand for transit service among the transportation disadvantaged (applied to New York City, New York State, Massachusetts, and Pennsylvania data).

by Mary McLaughlin, ed.
Transportation Res. Board, 2101 Constitution Ave., N.W.,
Washington, D.C. 20418
Rept. No. TRR-660; 1977; 55p refs
Availability: TRB \$3.40

HS-024 877

IMPACT TESTS ON CRASH HELMETS FOR MOTOR CYCLISTS

To provide data for use in the development of motorcycle helmet standards and in the development of the helmets themselves and to provide supporting evidence for the adoption of an up-to-date Australian standard, several samples of seven types (brands) of typical helmets, intended for use by motorcyclists, were subjected to a series of impact tests. The tests were carried out in accordance with the procedures described in the American National Standards Institute (ANSI) Specification Z90.1-1971. This standard was the basis for the U.S. Federal Motor Vehicle Safety Standard 218, and the early results of these tests led to its adoption as the current Australian standard, AS1698-1974. All helmets carried labels claiming compliance with recognized standards, but some of these standards were less severe than ANSI Z90.1-1971. The tests were conducted to show whether the high failure rate found in tests of U.S. motorcycle helmets also applied to Australian helmets. Most helmets cushioned a first impact and limited the peak acceleration to less than 75% of the permitted value. A second impact at the same site resulted in a higher peak acceleration and impacts near the edge at the front of the helmet usually resulted in an acceleration in excess of the permitted value. About half the helmets prevented penetration to the headform of the pointed indenter after it had fallen 3 m. The performance of new helmets with fiberglass and polycarbonate shells was similar. Four types of helmet, two with fiberglass shells and two with polycarbonate shells, were exposed to the weather for 15 to 17 months; one of the polycarbonate shells suffered degradation in its penetration resistance. The results generally endorse the test criteria of the standards. In particular, the limit of 4 km/sq sec (400 G) is considered satisfactory in conjunction with the paired impacts on each test site, and the 3-m drop of the indenter is practicable and should not result in an undue weight penalty even though it is much more severe than earlier tests. The results indicate that the standard should include tests to show performance in impacts at the front near the edge (or test line) and should include more definitive instructions regarding durability.

by N. D. Hearn; S. R. Sarraillhe
Defense Science and Technology Organisation, Aeronautical Res. Labs., P.O. Box 4331, Melbourne, Vic., 3001 Australia
Rept. No. ARL-STRUC-NOTE-445; AR-001-263; 1978; 35p
10refs

Sponsored by Dept. of Transport (Australia).
Availability: Corporate author

HS-024 878

POST LICENSING CONTROL REPORTING AND EVALUATION SYSTEM. SUMMARY REPORT. VOL. 1 [CALIFORNIA DEPARTMENT OF MOTOR VEHICLES]

As part of the California Traffic Safety Prog., the California Dept. of Motor Vehicles has implemented an ongoing reporting and evaluation system for the driver control and treatment activities of the Negligent Operator (Neg Op) component of its Post Licensing Control (PLC) Prog. The PLC Prog. includes a wide variety of mandatory and discretionary treatments and activities that serve to promote highway safety. The Neg Op component deals with drivers with high conviction and/or accident rates. The initial cost, effectiveness, and benefits data for the PLC Prog. are presented. The Neg Op treatment pro-

gram prevented 1200 accidents in 1975, resulting in an estimated benefit to society of from \$2,660,509 to \$6,465,220. Subtracting the reducible (estimate of cost saved by eliminating program) cost of treatment (\$2,485,278) yields a range of net benefits from \$175,231 to \$3,979,942. Results for individual treatments show considerable variation, depending on the criterion used. The Warning Letter (W/L) treatment, among the poorest at reducing accidents, was extremely good in terms of cost-effectiveness and cost-benefit criteria. The Individual Hearing (I/H) was effective at reducing accidents, but was less cost-effective than the W/L treatment. All treatments (W/L, Group Educational Meeting, I/H, and Probation Violator Hearing) were highly effective in reducing violations. Initial steps taken toward the implementation of a Recidivism Model and a Resource Allocation system are described to demonstrate feasibility of a more complete system of planning and management control. Also included is a description of a pilot study on accident rates of drivers in the Physical and Mental Condition treatment program, a possible initial step in expanding the PLC evaluation beyond the Neg Op component.

by John Magistad; Dan Kadell; Bill Howe
California Dept. of Motor Vehicles, Div. of Drivers Licenses, P.O. Box 1828, Sacramento, Calif. 95809
1976; 35p 7refs

Sponsored by California Office of Traffic Safety, and National Hwy. Traffic Safety Administration.
Availability: Corporate author

HS-024 879

TEXAS MOTOR VEHICLE CRASH DATA SETS AT HSRI [HIGHWAY SAFETY RESEARCH INSTITUTE]. FINAL REPORT

The Hwy. Safety Res. Inst. at the Univ. of Michigan maintains sets of computerized motor vehicle crash information describing traffic accident experience in Texas. Basic input information for the data sets is obtained from the Texas Dept. of Public Safety. The data are put into a fixed-format file structure that is amenable to most packaged analysis programs, and a set of new data elements is derived from the input data to make the information more accessible to the end user. As a final part of the construction process, documentation is generated for the computer files in the form of a codebook that describes data element (or variable) names, code values, and univariate frequencies. Descriptions are presented of the structure of the data sets, factors affecting the collection of the data, and their ultimate use in research studies. Appended are a codebook for use with 1977 data, a dictionary listing for current data sets, and bivariate table outputs showing the use of weighting variables in analysis operations. It is hoped that an understanding of the data will promote an increased awareness of the utility of police crash data in highway safety research.

by John A. Green; James O'Day
University of Michigan, Hwy. Safety Res. Inst., 2901 Baxter Rd., Ann Arbor, Mich. 48109
Rept. No. UM-HSRI-78-24; 1978; 133p 13refs
Sponsored by Motor Vehicle Manufacturers Assoc.
Availability: Corporate author

HS-024 880

NORTH CAROLINA PHYSICIAN'S GUIDE FOR DETERMINING DRIVER LIMITATION. NORTH

HS-024 881

CAROLINA DRIVER MEDICAL EVALUATION PROGRAM

Information is presented that practicing physicians may use to assess, advise and inform patients on their driving capabilities, and to provide information valuable to the North Carolina Driver Medical Evaluation Prog. Mental or physical conditions covered include metabolic diseases, musculoskeletal disorders, emotional disorders and mental illness, cardiovascular diseases, alcohol and drugs, neurologic disorders, vision, hearing, and aging. Since 1964 the State Medical Society has worked with the Div. of Motor Vehicles to evaluate medically impaired drivers. The Society's Com. on Traffic Safety developed general guidelines and administrative policies concerning licensure and recruited physicians to serve on consultant panels to review individual cases. The findings of the panels are reported to the Div. of Motor Vehicles. The final decision to grant, revoke, or restrict a driver's license rests with the Commissioner of Motor Vehicles. Cases may be appealed to the Medical Review Board whose decisions are binding, subject to judicial review.

North Carolina Dept. of Human Resources, Epidemiology Section, P.O. Box 2091, Raleigh, N.C. 27602
1973; 28p
Availability: Corporate author

HS-024 881

HIGHWAY LIGHTING TO PREVENT DEER-AUTO ACCIDENTS. FINAL REPORT

Deer-vehicle accidents have been the cause of considerable property damage and loss of biotic resources, especially in rural areas in mountainous terrain where nighttime driver visibility is poor. In order to determine if deer-vehicle accidents were affected by fixed highway illumination, a comparison was made of responses of motorists to deer on the highway and deer responses to motorists, with and without fixed illumination. The study area was located three miles south of Glenwood Springs, Colo., on State Highway 82, a four-lane highway at this point, with a 55 mph speed limit. Thirteen 37,000 lumen, 700 watt, clear mercury vapor lamps mounted on 3.05-m (10-ft) arms at the top of 12.2-m (40-ft) metal poles were used, illuminating a 0.40-km (0.25-mi) section of highway. Transition lighting was provided. It was concluded that highway lighting did not affect the location of deer crossings, in that deer continued to cross at their natural location when it was illuminated at night. If any effect was detected, it was that a greater proportion of deer crossed in the lighted area than when the lights were off. Estimated deer crossings per kill were 9.7% higher with lights on than with lights off. The speed of motorists was not affected by the lighting. However, when a deer simulation was present, motorists significantly reduced speed (a decrease in mean vehicle speed of 13.9 kmh) (8.6 mph), with brake lights observed on 50.6% of the approaching vehicles). Since the small size of the sample warrants cautious interpretation of the data, it is recommended that the study continue through 1978 and 1979. The Road Lighting Com. (1972) recommends lighting standards based on mean horizontal illumination and illumination uniformity ratios for different roadway and area classifications. Attached is a tabulated cost/benefit analysis of 2.44-m (8-ft) fencing, animated deer crossing signs, and highway lighting. Appendices contain an article, Effectiveness of a Lighted, Animated Deer Crossing Sign, by Thomas M. Pojar et al, reprinted from the

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Journal of Wildlife Management (v39, n1, Jan 1975 pp 87-91), and a list of publications by The Colorado Dept. of Highways.

by Dale F. Reed; Thomas N. Woodard; Thomas D. I. Beck
Colorado Div. of Wildlife, 6060 Broadway, Denver, Colo. 80216
1478
Rept. No. CDOH-PandR-R-77-5; FHWA-CO-77-5; PB-284 312; 1977; 34p 21refs
Rept. for 19 Sep 1969-30 Sep 1977. Prepared in cooperation with Colorado Div. of Highways and Federal Hwy. Administration.
Availability: NTIS

HS-024 882

ETHYLENE/ACRYLIC ELASTOMERS--NEW CANDIDATES FOR SEALING APPLICATIONS

Ethylene/acrylic elastomers (EAE) have joined previous high-temperature elastomers such as polyacrylate, silicone, and fluorocarbons as candidates for new automotive sealing applications. EAE's provide effective sealing from -65 degrees F (-54 degrees C) to 350 degrees F (177 degrees C). They do not revert; they show excellent resistance to seal wear; and they possess a good balance of physical and chemical properties. Combined with competitive pricing (roughly the same as a good low-temperature polyacrylate), these benefits provide the design engineer with a new candidate material for solving high-temperature sealing problems. Basically, EAE's are copolymers of ethylene and methyl acrylate. Finished and molded products are supplied in various colors, as well as black. Sacrifices in heat and compression set resistance are apparent in colored compounds. EAE compounds show satisfactory resistance to engine, transmission, and power-steering fluids in addition to some gear oils. Resistance to water and engine coolants is considered good. EAE's have excellent vibration damping characteristics which remain fairly constant over broad ranges of temperature, frequency, and amplitude. Like most other elastomers, they should not be used to seal gasoline, passenger car brake fluid, phosphate ester based hydraulic fluids, and concentrated acids. Based on past experience and test data, EAE's must be considered seriously for transmission front pump, clutch, and engine front crank shaft sealing applications. Other future possibilities include the engine rear crankshaft, the transmission extension and shifter shaft, the power steering pump, and possibly, the pinion seal. General purpose EA compound ingredients and physical properties are listed, and a table presents a comparison of properties of EAE, polyacrylate, silicone and butan nitrile (NBR).

by John Carr; Arthur Ginn
Publ: Elastomerics v110 n2 p24-8 (Dec 1978)
1978
Availability: See publication

HS-024 883

HOW PAYING FOR AIR CAN SAVE MONEY

A reply is made in the form of a letter to Joan Claybrook, Administrator of the National Hwy. Traffic Safety Administration, who asked the nation's tire makers to urge that service stations provide free air. Compressed air is not "free", since its cost to the station owner is spread over other services. That which is free is not appreciated. Most consumers only check their tires' air pressure about once a year. Having to pay for compressed air might alert consumers to the real value

Aug 31, 1979

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of keeping their tires at the correct inflation pressure. Riding on tires that are not properly inflated will reduce their useful mileage. If charging for air reminds motorists to check their tires, it might prove to be cheaper than replacing expensive radials some 10,000 miles sooner than would otherwise have been necessary. Both the gas station operator and the consumer would benefit.

by Harry C. McCreary

Publ: Tire Review v78 n12 p39, 46 (Dec 1978)

1978

Availability: See publication

HS-024 884

TEMPORARY SPARES--THREE TYPES SAVE WEIGHT AND SPACE

Temporary spares were provided on 30% of the new cars in 1978 because of the need to reduce car weight to meet fuel economy standards. There are three types of temporary spares-- folding, high-pressure, and "skin" type. All are lighter and occupy less space than a conventional spare. The folding spare, introduced by Goodrich, and also made by Goodyear, saves more space than the others. After mounting, the tire is filled with freon or carbon dioxide from a canister; air can also be used. The spare inflates to a normal-size tire and can be used on any car. The high-pressure spare or "bicycle spare" is smaller in diameter than the folding one, and thinner, and should only be used on cars for which it was designed as original equipment. It is stowed inflated. The "skin" spare, when stowed, more closely approximates the conventional spare tire. Although thinner and lighter, it may have a larger outside diameter than the tire it replaces, and should be used only on cars for which it was designed as an original-equipment item. It is sometimes referred to as the "lightweight" or "ready-to-use" spare. All three tires are of bias construction and should not be driven over 50 mph. They have a useful life of over 2000 miles, but are designed to be used only as temporary spares.

by Ray Hill

Publ: Popular Science v214 n1 p85 (Jan 1979)

1979

Availability: See publication

HS-024 885

THE AMOUNT OF VEHICLE OPERATION OVER 50 MPH. DRAFT TECHNICAL REPORT

All existing public information regarding the amount of miles traveled and time spent by motor vehicles operating at speeds greater than 50 mph in the U.S. has been compiled, and has been compared with parameters calculated from the Environmental Protection Agency (EPA) dynamometer driving schedules. The three primary sources used for gathering the vehicle speed information are the Federal Hwy. Administration's (FHWA) Highway Statistics for 1974 and 1975, Scott Res. Labs. (SRL) Vehicle Operations Survey, and General Motors' (GM) Chase Car Survey. Data reported by the FHWA indicate that for free-flowing traffic in the U.S., over half of the passenger cars traveled at a speed greater than 50 mph in both 1974 and 1975. Approximately 54.8% in 1974 and 63.1% in 1975 of the total U.S. vehicle miles traveled (VMT) were conducted at speeds greater than 50mph when the traffic was free-flowing. The percent of VMT at speeds exceeding 50 mph

for rural roads (with free-flowing traffic) was approximately 68.8% for 1974 and 77.0% for 1975. These percentages are significantly higher than the 54.9% for the EPA Highway Dynamometer Driving Schedule (HDDS). Since the HDDS is basically a free-flowing traffic cycle, it appears that the HDDS does not include sufficient real-world high speeds. This is due largely to the fact that the HDDS represents rural driving in the southeastern part of Michigan and a freeway segment in northern Ohio soon after enforcement of the 55 mph speed limit in Ohio. The driver flowed with the traffic when possible, and when he was not in traffic he purposely maintained a maximum speed of 55 mph. SRL data reveals that 10% of the average urban operation time is spent at speeds greater than 52.5 mph. The EPA Urban Dynamometer Driving Schedule (UDDS), representative of Los Angeles city driving in 1969, has 3.87% of its speed points over 52.5 mph. A comparison of the GM chase car data to those of the UDDS and HDDS indicates that GM monitored more high speeds than the EPA schedules account for.

by Myriam Torres

Environmental Protection Agency, Emission Control Technology Div.

Rept. No. PB-284 419; LDTP-78-13; 1978; 21p 10refs

Availability: NTIS

HS-024 886

LOAN A SEAT FOR SAFETY. HOW TO ESTABLISH AND OPERATE AN INFANT AND CHILD RESTRAINT LOAN PROGRAM

This manual was developed as part of Michigan's Motor Vehicle Occupant Protection Prog. to encourage and facilitate action by service organizations and other groups to establish child restraint loan programs. The loan program involves a sponsoring organization which obtains some infant restraint systems, publicizes their availability, and loans them out for a service charge and a deposit. After the infant has outgrown the seat, the parents may return it and get their deposit back. The sponsoring agency will then loan them a toddler restraint or give them advice on where to buy a good one. Service charge funds are used to cover expenses, to buy more restraints, or to finance other projects of the organization. Guidelines are presented on staff and space requirements, supplies and equipment, types of restraints to offer, obtaining the first group of restraints, rental fees, selling new restraints, sales and use tax, helping others sell or swap, attracting parents to the loan program, the usual procedure for loaning a seat, and evaluation of the effectiveness of the loan program. Appended are descriptions and addresses of some typical programs, an illustrated list of safe child restraints (shopping guide), a list of manufacturers of child restraints, a copy of an application form for a retailer's license (sales tax) for the State of Michigan, a sample rental form, a sample return reminder letter, a guide for the publicity committee, sample news releases, procedures for observing the use of child restraints, and sources of safety information relating to child restraint systems.

Michigan Dept. of State Police, Office of Hwy. Safety Planning, 7150 Harris Drive, General Office Bldg., Lansing, Mich. 48913; Traffic Safety Information Council 1978?; 90p refs

Availability: Department of State Police, Office of Hwy. Safety Planning, 7150 Harris Drive, General Office Bldg., Lansing, Mich. 48913

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ECONOMIC IMPLICATIONS OF AUTOMOTIVE SAFETY: THE PASSIVE RESTRAINT DECISION

The economic implications are analyzed of the Dept. of Transportation's (DOT) ruling requiring passive restraint systems (air bags or passive belts) in all front seating positions of automobiles sold in the U.S. beginning in 1984. The incremental costs and benefits of each system are considered separately if the fleet were to be equipped at a ten million cars per year rate. Benefit comparisons are made with those of current belt systems at a 44.2% usage rate, the usage rate forecast for 1984, and usage actually observed in 1975 models in towaway accidents. The aggregate net benefit is determined by adding 50% of the all-air-bag net benefit to 50% of the all-passive-belt net benefit. The most optimistic result, based on the DOT estimate of air bag effectiveness and on the assumption that passive belts will be equal in performance to current belts at 80% usage, is that over a 20-year period a \$2 billion aggregate loss will be realized on a new-equipment investment of \$15.3 billion. A less optimistic result, based on the current field data from air bag equipped cars, but still assuming the same performance of passive belts, is that the DOT ruling will cost U.S. consumers \$10 billion over a 20-year period. If the DOT ruling had been restricted to requiring passive restraints only in cars having two front seating positions, so that air bags would not be needed, a substantial 20-year benefit of \$9.72 billion would accrue on a new-equipment investment of only \$3.75 billion.

by Howard P. Gates, Jr.
Economics and Science Planning, Inc., 1200 18th St., N.W.,
Suite 610, Washington, D.C. 20036
1977; 15p 1ref

Prepared for presentation at 3rd International Conference of
System Safety Society, 19 Oct 1977.
Availability: Corporate author

HS-024 888

OBSERVED DAYTIME SEAT BELT USE IN VANCOUVER BEFORE AND AFTER THE BRITISH COLUMBIA BELT USE LAW

Daytime seat belt use by drivers and right front passengers in Vancouver was observed prior to a mandatory belt use law enacted on 1 Oct 1977 in British Columbia, and in the first week, sixth month, and ninth month after the law was implemented. Belt use by drivers increased to 79% the first week of the law, dropped to 67% in the sixth month, and was 66% in the ninth month, suggesting that a daytime driver use rate of 2 out of 3 may be sustainable. Shoulder belt use by right front passengers also increased initially, was lower in the sixth month, and was lower still in the ninth month, suggesting that further reduction may occur. Use rates did not decrease to levels as low as in Ontario where belt use was 71% in the second month of the law (law enacted on 1 Jan 1976) and 48% by the sixth month. In Ontario the law was weakened in its second month by exempting shoulder (but not lap) belt use in cars manufactured or imported before 1 Jan 1974. It is emphasized that even though belt laws in some countries have resulted in moderate reductions in occupant deaths, there is greater potential for such reductions through measures that au-

tomatically provide protection to vehicle occupants (i.e. passive restraint systems).

by Allan F. Williams; Leon S. Robertson
Insurance Inst. for Hwy. Safety, 600 Watergate, Suite 300,
Washington, D.C. 20037
1978; 13p 17refs
Availability: Corporate author

HS-024 889

ANNUAL SCHOOL BUS ACCIDENT REPORT. 1976/77 [CALIFORNIA]

Statistics are compiled for all school bus accidents occurring in California during the 1976-1977 fiscal year which resulted in property damage or personal injury. Some figures for that period include the following: school bus miles driven, 211,355,744; school buses operated; 16,114; school bus accidents, 1711; school bus fatal accidents, 2; school bus injury accidents, 315; pupil passenger fatalities, 1; pupil pedestrian fatalities, 1; pupil passenger injuries, 314; fatal accident rate per million miles driven, .009; and injury accident rate per million miles driven, 1.49. The 1976-1977 accident total reflects a 6.87% increase over the previous year. This increase is proportionate to the accident increase experienced by the general motoring public during the same period, although California criteria for reporting school bus accidents differ from those of other states, and accidents involving school buses are reported differently from accidents involving the motoring public.

California Hwy. Patrol, P.O. Box 898, Sacramento, Calif.
95804
1978; 38p
Availability: Corporate author

HS-024 890

WHAT COLOR SHOULD REAR TURN SIGNALS BE?

The history of automotive turn signals, and the current worldwide situation are outlined (emphasis on U.S. and Europe), and the results of a 1974-1975 questionnaire survey developed by the German motor vehicle industry (VDA) are presented. The questionnaire was submitted to American military personnel stationed in Germany, Belgium, and The Netherlands to obtain their preferences as to the most effective color for rear turn signal lamps (these persons having experienced driving where both red and yellow lamps were used). All countries except the U.S. and Canada presently use yellow signal lamps; in these two countries, with the exception of some recently-introduced models, domestic automobiles have red signals, and most imported cars have yellow. The regulations of both countries require that the hazard warning system flash all four turn signals regardless of color. American motor vehicle authorities maintain that while yellow may have advantages under certain conditions, a yellow signal bright enough to be seen in daylight, is too glaring at night. They note further that it would be expensive to convert from red to yellow signals, since the entire lighting system would have to be redesigned. Other countries claim that yellow eliminates the confusion generated by red taillight, stoplight, and turn signals, and that light intensities could be adjusted to reduce glare, so that on balance yellow is safer than red. These authorities state that besides eliminating technical barriers to international trade, switching to yellow would not be costly if effected with the introduction of new models, as has been done on a few current domestic

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automobiles. In response to a survey question regarding most effective color for rear turn signals, the respondents, most whom had more than two years of driving experience in Europe and had been raised in either the U.S. or Canada where red turn signals predominate, favored yellow lights over red lights by a vote of 1661 to 1259. It is concluded that yellow is the superior color for rear turn signal lamps if the brightness is correct.

by Erwin G. Hitzemeyer; Helmut Wilde; Donald Ellenberger
Volkswagenwerk A.G., Germany; Volkswagen of America, Inc.
Rept. No. SAE-770812; 1977; 18p 27refs
Presented at Passenger Car Meeting, Detroit, 26-30 Sep 1977.
Availability: SAE

HS-024 891

STATE OF NEW JERSEY 1977 ACCIDENT DATA, TRAFFIC VOLUMES AND MILEAGE ON THE STATE HIGHWAY SYSTEM BY ROUTE, COUNTY AND MUNICIPALITY

A computer printout of tabular data is provided on New Jersey highway accidents in 1977. Summary tables present fatal and injury accidents (number and rate) by number of highway lanes and traffic volume. These are then subdivided by location (counties, routes and municipalities).

New Jersey Dept. of Transportation, 1035 Parkway Ave.,
Trenton, N.J. 08625
1978; 55p
Availability: Corporate author

HS-024 894

FACTS ON ROAD TRAFFIC ACCIDENTS AND SAFETY OF AUTOMOBILES. ACCIDENT RESEARCH METHODS OF GERMAN MOTOR TRAFFIC INSURERS AND RESULTS FROM A STUDY ON 15,000 CAR CRASHES WITH PASSENGER INJURY

Accident research has been conducted continually for more than nearly ten years by the German Assoc. of Third-Party, Accident, Motor Vehicle and Legal Protection Insurers (HUK-Verband) in an effort to improve road traffic safety in Germany. The history of accident research by German motor traffic insurers is reviewed, and present and future work is outlined. HUK accident research involves a case-by-case analysis of accidents from comprehensive data compiled by automobile insurers. The evaluation procedure, the grouping of data (information pertaining to the accident in general, damage sustained by the cars and/or obstacles involved in the accident and injured and noninjured occupants), the compilation and processing of data, and the multiphase analysis of data are described. Results are presented from an analysis of 15,000 injury-producing car crashes during 1974; data are given on accident characteristics, vehicle damage, occupant injuries and their consequences, and injury reduction by safety belt usage. The ramifications of the HUK traffic accident research are discussed in terms of possible legislative measures, safety requirements to be met by the auto industry, requirements to be met by all motorists (e.g. safety belt usage), and requirements to be met by accident research. Appended are a list of HUK-Verband accident research publications, an example of crash reconstruction and evaluation in HUK investigations, an

excerpt from car model code used by HUK in the 1974 study, examples of car damage classification, and an excerpt from the American Assoc. for Automotive Medicine Abbreviated Injury Scale.

HUK-Verband, Leopoldstrasse 20, 8000 Munchen 40,
Germany
1978; 129p 39refs
Availability: Corporate author

HS-024 895

GROWING YOUR OWN FUEL

Research in new sources of power is described, beyond nuclear energy and the gasification of coal, which could afford the U.S. freedom from dependence upon Arab oil and could lead to a new industrial revolution. The reactivation of small oil wells (secondary recovery) by new energy-efficient systems is explored. The most promising of these is the Merkl process, based on the use of inorganic polymers such as silicon or graphite. The process involves the release of atomic hydrogen by a polarized hydrogen bond. The hydrogen cracks the light end of the oil molecule, creating natural gas, which forces the trapped oil out of the rock to form a pool or reservoir, making it accessible to conventional collection methods. The Merkl process is especially promising for trapping natural gas. The estimated cost of producing oil through this method is not over \$5/bbl. This process is envisioned as useful only for the short term, since oil reserves will eventually run out. Fuel from "biomass" is also being tried. The Brazilian government has an extensive program for producing ethanol from sugar cane (200 million gallons in 1977), and manioc (a form of tapioca) is also being evaluated as a source. Since ethanol is cleanburning, there is no pollution problem. An Oklahoma company is producing methane, carbon dioxide and ammonia from unused cattle feed and other wastes. About 40% of Hawaii's electricity is generated by burning sugar cane wastes, and some European cities use garbage as a whole or partial substitute for oil in their power-generating plants. A mixture of 10% alcohol from fermented grain and 90% regular gasoline is being used in many U.S. areas, especially the Midwest. The U.S. Naval Academy is conducting research on the Blaser Engine, or the Naval Academy Heat-Balanced Engine (NAHBE), which is more efficient than the conventional combustion engine; it gives increased mileage, is 98% free of noxious emissions, operates at lower pressures (resulting in lower repair bills), has a lower compression ratio, and can use gasoline, diesel fuel, alcohol, benzene or kerosene. Research on nitrogen fixation is aimed at replacing petroleum as a source of fertilizer. Geothermal wells have been successfully tapped in New Mexico, although the process is economically feasible only under certain geological conditions. Among solar energy approaches that may have possible use in the long term are ground-based solar thermal plants, geosynchronous solar satellite stations (GSSS), and low-orbit solar satellites (LOSS). George Merkl, the pioneer in secondary oil recovery, is also investigating production of pure hydrogen from water for fuel. Beside searching for substitutes for Arab oil, research needs to consider methods which will not disturb the planet's life support system, and which will be available for world-wide use.

by Norman Cousins
Publ: Saturday Review v5 n25 p23-6, 28 (30 Sep 1978)
1978
Availability: See publication

HS-024 896

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ENERGY USE IN FIELD OPERATIONS-- OPPORTUNITIES FOR CONSERVATION

Results are presented for the field operations portion of an 18-month agricultural production energy conservation project initiated in 1976 by Kansas State Univ. and the Univ. of Nebraska. The project was designed to test the hypotheses that energy conservation on the farm is practical and profitable; that a model program of relatively low cost could be designed and effectively implemented, in cooperation with the national, regional, and field offices of the Dept. of Energy and the Dept. of Agriculture, through existing institutional networks; and that significant statewide energy savings can result. The project addressed seven specific energy-intensive inputs to production agriculture: field operations (including plowing, planting, and harvesting), crop drying, irrigation, fertilizer applications, pesticide applications, on-farm transportation, and electrical consumption (including motors, lights, and heaters). The results of the field operations portion are reported, including existing technology for increasing energy-use efficiency; energy-use data collected on Kansas farms; energy-conservation demonstrations involving existing technology such as gear up-throttle down, and proper wheel ballasting; instrumentation for the demonstration tractor; and opportunities for industry involvement in energy conservation. Results indicate that farmers are interested in saving fuel; they are becoming more energy-conscious in their management decisions, and many opportunities exist for future energy-related developments. The farmers who cooperated in collecting fuel-consumption data indicated that fuel recordkeeping made them much more aware of energy costs for individual operations. It was shown that the use of currently-available energy-conservation technology results in significant energy savings. The field demonstrations were highly successful in showing farmers exactly how to accomplish several conservation techniques. Industry can play a very important role in agricultural energy conservation by emphasizing fuel conservation in instruction manuals and in dealer training, by designing and building more efficient engines, and by developing improved instrumentation for use on farm machinery (e.g. inexpensive, reliable, solid-state fuel flow-meters).

by Stanley Clark; Mark D. Schrock; John A. Kramer
Kansas State Univ., Agricultural Engineering Dept.,
Manhattan, Kans.
Rept. No. SAE-780721; 1978; 16p 5refs
Technical Paper Series. Presented at Off-Highway Vehicle
Meeting and Exposition, Milwaukee, 11-14 Sep 1978. Research
sponsored by Dept. of Energy.
Availability: SAE

HS-024 897

CEMOTER X77--A HYDROSTATIC RESEARCH VEHICLE

Some of the major design concepts, features, and specifications are discussed for CEMOTER's X77 Hydrostatic Research Vehicle, a tractor-type vehicle completed in its present form in 1977 and officially presented at the International Agricultural Fair in Verona, Italy. Particular emphasis is placed on the favorable aspects of the vehicle's integral hydrostatic power transmission. In spite of the vehicle's tractor-like appearance, it is not meant to be competitive or compared with tractors on the market; neither is it a prototype, since no specific commercial application has yet been determined. A

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number of qualitative tests have been completed, some private demonstrations. The vehicle is present be tested in accordance with EEC (European Community) standards for agricultural tractors.

by Gianni Rigamonti; Gian Luca Zarotti; Nicola Nei
CEMOTER, Torino, Italy; Istituto di Macchine, Pol
Torino, Torino, Italy
Rept. No. SAE-780726; 1978; 14p 3refs
Technical Paper Series. Presented at Off-Highway V
Meeting and Exposition, Milwaukee, 11-14 Sep 1978
Availability: SAE

HS-024 898

THE EVALUATION OF VEHICLE VIBRATIC SEATS

Measurements of vibration in a variety of vehicles makes of cars, vans, buses, trucks, and electric everyday use in Britain are compared with the vibration levels provided in the International Organization for Standardization Standard ISO 2631-1974(E), Guide to the Evaluation of Human Exposure to Vibration. For many durations, many of the vibration levels are shown to be in excess of the levels corresponding to the "reduce boundaries" and "fatigue decreased proficiency boundaries" defined in the ISO Standard. A method of evaluating vibration attenuation of vehicle seats is defined, shown that poor vibration isolation is provided by many seats of the 16 vehicles studied. Several areas of improvement are proposed for a revised Standard. The method of measuring and analyzing vibration requires a clear definition of evaluation criteria. It must be recognized that the effects of vibration can depend on factors other than the physical nature of the vibration (e.g. reductions in comfort depending on conditions of performance decrements depending on the task, and depending on subject type). The separate consideration of three principal groups of criteria (comfort, performance, health) is probably necessary for the resolution of the problem over the effects of vibration duration and the shape of frequency weightings. Perhaps the most desired emphasis concerns the use of vibration limits. For product design and specification there is a need to know, in terms, the effects of particular levels of vibration. Such "effect" relationships may then be used to determine acceptable vibration levels for different situations. A system formulated would provide only the basic information and methods to enable designers and engineers to measure and compare vibration levels and to determine the appropriate limits for their systems. The basic guide would provide information upon which many other groups could formulate their own system and equipment standards, draft specifications and negotiate contracts.

by M. J. Griffin
Publ: Applied Ergonomics v9 n1 p15-21 (Mar 1978)
1978; 8refs
Availability: See publication

HS-024 899

TECHNIQUES AVAILABLE FOR THE ASSESSMENT OF PASSENGER COMFORT

Consideration is given to various techniques available to the ergonomist for evaluating passenger comfort. If the s

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a whole is to be investigated, a questionnaire technique is suggested. If a more specific investigation is required, consideration should be given to conducting field tests using actual passengers, or to laboratory tests. Techniques such as rating scales, observation, paired comparison, and the semantic differential are described, although many other laboratory-based techniques are available. Using passengers provides direct reactions from the people for whom the engineer is designing a vehicle. Another advantage of using subjects is the investigator's easier task when providing instructions, and, perhaps, in interfering with subjects (e.g. attaching electrodes). Because of their ease of application, rating scales may be used in either environment. These scales provide quantitative measures of subjective responses and may be used to give direct qualitative indications, although care must be taken in the interpretation of data. Observation and self-observation (introspection) are also extremely useful techniques, although the number of observations produced may make analysis at best tedious and at worst extremely difficult. In the lab, controlled levels of stimuli may be presented to provide direct indications of comfort levels, but practical problems in experimental design tend to invalidate many of the results.

by D. J. Osborne

Publ: Applied Ergonomics v9 n1 p45-9 (Mar 1978)

1978; 20refs

Availability: See publication

HS-024 900

MOTOR VEHICLE INJURIES: CAUSES AND AMELIORATION

An examination is presented of the causes of motor vehicle injuries in the context of classic public health problems. Until recently public health principles were not applied to motor vehicle injuries, the problem being considered mainly one of law enforcement and education. This approach was based largely on the mistaken assumption that errant driver behavior caused the crashes and that driver behavior had to be changed to reduce the crashes. Past approaches to the amelioration of these injuries (e.g. substantial penalties for driving under the influence of alcohol, Alcohol Safety Action Projects) have not been successful, and it is indicated that injuries can be greatly reduced by adopting the approaches that have greatly reduced public health problems in the past. Two basic principles emerge from research on motor vehicle injuries that are the same as those used to combat public health problems. The key to control of damage is finding necessary conditions for the damage and reducing or eliminating one or more of those conditions. Mechanical-energy transfer in motor vehicle crashes is such a condition, analogous to the microorganisms that are a necessary condition for health damage. Programs that reduce or eliminate the conditions for damage without attempting to change every individual's behavior are more successful than attempts at behavior control. For example, steering assemblies that absorb energy in crashes are beneficial, and speed-limiting "governors" would reduce speeding. Pedestrians should be separated from motor traffic wherever possible. Laws and education programs directed at driver behavior are much less successful and some have been harmful. A case in point is the increase in crash involvement per driver as a result of driver

education, since those having instruction are more likely to drive than those not receiving instruction.

by Leon S. Robertson

Publ: ITE Journal v48 n11 p16-8 (Nov 1978)

1978; 26refs

Sponsored by Insurance Inst. for Hwy. Safety. Reprinted from Public Health Reviews.

Availability: See publication

HS-024 901

GREEN-EXTENSION SYSTEMS AT HIGH-SPEED INTERSECTIONS

Data were collected at various high-speed intersections in Kentucky to evaluate green-phase extension (GES) systems in terms of traffic accidents, traffic conflict, traffic efficiency, and economics. There have been attempts to decrease the number of rear-end and right-angle collisions by installing GES systems. These systems include presence-detection loops in the pavement preceding the intersection which transmit messages to a receiver in the signal control box. An extension of the green phase occurs only if a vehicle is passing over the detector within an interval which has been predetermined as the dilemma zone. An extension of the green phase at this point permits the vehicle to proceed through the intersection without having to stop abruptly to avoid running a red light. To determine the length of the dilemma zone, driver responses were recorded at nine high-speed intersections in Lexington and Louisville. The dilemma zone has been defined as the distance interval with a probability of stopping between 10% and 90%. Dilemma-zone curves were constructed for vehicle speeds of 35 mph, 40 mph, 45 mph, 50 mph, and 55 mph. For example, the dilemma zone for motorists travelling 45 mph was from 152 ft to 325 ft. Before and after (installation of GES systems) studies at three sites in Kentucky showed that for the study period there were 70 accidents before GES and 14 accidents after, or a rate of 8.2 and 3.8 accidents/year, respectively. Rear-end accidents were reduced about 75%; right-angle accidents decreased about 31%; other types of accidents experienced minor reductions. A traffic conflict (i.e. traffic violation or evasive action which is forced upon a driver to avoid an accident) study in Ashland and Stanford showed the number of conflicts per hour decreased after GES from 17.4 to 10.5 in Ashland and from 8.4 to 1.3 in Stanford based on the mean number of conflicts per period. Average traffic speeds were found to increase slightly at the same two sites after GES, and no significant changes were found in the number of stopped vehicles on the side streets nor significant increases in vehicle delay on side streets. Measurements in Stanford show a significant reduction in the percentage of no-stop vehicles on the side street after GES. In terms of rear-end accidents, total net benefits computed for GES (over 10-year life) varied from about \$29,000 to over \$420,000, depending on accident history.

by Charles V. Zegeer; Robert C. Deen

Publ: ITE Journal v48 n11 p19-24 (Nov 1978)

1978; 14refs

Availability: See publication

HS-024 902

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A CROSS-SECTION ANALYSIS OF THE DEMAND FOR NEW AND USED AUTOMOBILES IN THE UNITED STATES

The effects of income and other family characteristics on the demand for new and used automobiles in the U.S. are investigated. This analysis differs from previous studies in that it attempts to explain a family's automobile age choice, and it involves two data sets taken sufficiently separate in time (1959 and 1970 Surveys of Consumer Finances) to test the stability of the proposed relationships. Increases in income are found to affect positively the probability of multiple ownership as well as to increase the probability of owning a newer car. Older heads of households are associated with reduced likelihood of owning any automobile. As family size increases, the probability of owning older cars and the chances of multiple ownership both increase. The models are reasonably stable over the two time periods.

by Terry R. Johnson
Publ: Economic Inquiry v16 n4 p531-48 (Oct 1978)
1978; 15refs
Availability: See publication

HS-024 903

REGULATING THE AUTOMOBILE

Five analyses by individual authors are presented, aimed at clarifying the nature of the U.S. system of automotive regulation, its impact, and the reasons for its structure. A comparative analysis of safety, fuel economy, and emissions regulation yields insights into the effects of different types of regulatory standards on manufacturers' incentives for equipment durability and for development of innovative technology. The nature and extent of uncertainty in automotive emissions control is examined for four key variables: prediction of vehicle emissions, prediction of ambient air quality, measurement of emissions, and measurement of air quality. The impact of the fleet average fuel economy standards on pricing and structure of the automotive industry is examined in a microeconomic analysis. The political choice between standards and taxes for controlling automotive emissions is explored. The particular political history of the Clean Air Amendments of 1970 is examined to understand the creation of the unusual structure of the American automotive emissions regulatory system.

by John B. Heywood; Henry D. Jacoby; Lawrence H. Linden; Howard Margolis; David Iverach; E. Allen Jacobs; Frank Lerman; Michael K. Martin
Massachusetts Inst. of Tech., Energy Lab., Cambridge, Mass. 02139
NSF-OEP-76-00284
Rept. No. PB-278 123; MIT-EL-77-007; NSF/PRA-7600284/1/8; 1977; 288p refs
Rept. for Sep 1975-Aug 1977.
Availability: NTIS

HS-024 904

DESIGN OF URBAN STREETS. STUDENT TEXTBOOK

The Urban Transportation Operations Training Prog. provides instructional material, including short seminar courses, in various aspects of urban transportation. The course objectives,

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oriented toward operating agencies at the local, state, and Federal level, are to review material "lost" through the years; over a period of years, and to present new ideas and to bring participants up to date in all aspects of urban street design. The participant will conduct or supervise street design data acquisition necessary for street design work; evaluate the existing street system on the basis of street function; develop major street plan and design standards for urban areas; identify and correct design oriented street operation problems; make application for various street improvement programs; review construction plans for efficiency and prepare environmental impact statements; give consideration to transit, pedestrian, and bicycle requirements; and design with the requirements of signal timing and intersection. The course includes a review of urban street planning concepts and of design factors, including specific material on current practice. New factors influencing the work of the urban designer are emphasized; these include pedestrian and bicycle transit operations, environmental impacts, multidisciplinary teams, citizen involvement, financial and management and new technology. Primary emphasis is on geometric and traffic operational design, although drainage and design are also discussed. Fundamentals of roadway traffic data collection and analysis, and traffic control are reviewed, and there is a description of the impact of urbanization on transportation work. Citations are included in chapter, and appendices contain detailed examples of related items.

by William R. Reilly; James H. Kell; Iris J. Fullerton
JHK and Associates, San Francisco, Calif. and Tucson 1977; 473p refs
Sponsored by Federal Hwy. Administration.
Availability: GPO

HS-024 905

ASSESSING THE DRIVING POTENTIAL OF THE HANDICAPPED

The factors involved in the occupational therapist's evaluation of the handicapped person's potential for driving a motor vehicle are discussed. Driving aids for minimally-impaired, moderately-impaired, maximally-impaired, and severely impaired drivers are discussed in terms of operation and evaluation. Minimal impairment (early stages of multiple sclerosis, CVA, peripheral nerve injury) necessitates minor aid and change of interface only; moderate impairment (paraplegia, C-7-8-T1 quadriplegia), requires the use of substitute foot control functions; maximal impairment (C-6 quadriplegia) requires the use of substitutes for all foot control functions and modifications of the driving position; and severe impairment (C-5 quadriplegia) requires the use of substitute foot control functions, as well as modifications of hand control functions (such as the Servo-hand Control) and the driving position. Key factors in the driver evaluation of the handicapped and characteristics of the individual are discussed. Factors are the physical and perceptual capabilities, capabilities, and psychosocial characteristics (i.e. family economic status) that influence a person's ability and driving. With a knowledge of available driving aids, modifications needed to drive, and the cognitive and perceptual deficits and their relationship to driving, the occupational therapist should be able to make an early and proper assessment of a client's driving potential. Other factors such as hearing, vision, visual acuity, peripheral vision, distance judgment,

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reaction time, and possible physical spasms should not be overlooked in the preliminary driving evaluation.

by Gary D. Gurgold; David H. Harden
Publ: American Journal of Occupational Therapy v32 n1 p41-6
(Jan 1978)
1978; 10refs
Availability: See publication

HS-024 906

MOPEDS. PT. 1

Various legal requirements and characteristics of mopeds are reviewed with reference to specific moped models (2 American and 8 European) tested (results to be included in Pt. 2). The regulations governing mopeds vary widely; classification of the vehicle, rules of the road, standards of required equipment, minimum age of the rider, licensing, registration, insurance requirements, and limits on the machine's power and speed differ among jurisdictions in the U.S. and Canada. Mopeds such as those tested fall into two very distinct classes, the first almost literally being a motorized bicycle (as exemplified by the Velosolex and AMF models), the second, more common type, being what might be termed a small "pedalizing motorcycle". An important difference between mopeds and motorcycles is that the simple moped transmissions are all automatic; in most cases, the moped has only a single, fixed gear ratio and an automatic centrifugal clutch. Most mopeds can be started either while they are stationary on a center stand with a rear wheel off the ground, or while rolling. Two kinds of seats were found on the mopeds tested: a large, horizontal, rigidly-mounted cushion extending back over the rear wheel, and a type resembling a wide bicycle seat, mounted on springs. The models tested, except for the rigid-framed AMF and Solex, had motorcycle-style suspension systems for both wheels. Components such as speedometers, brakes, pedals, electrical equipment, fuel valves, controls, carburetors, tires and chains, are made by a limited number of specialized manufacturers. Almost exclusively, mopeds have drum brakes on both wheels, controlled via Bowden cables from hand levers. As mopeds normally have no batteries, the lights and horn function only while the engine is running. Weak points of mopeds include the need for signaling by hand (most mopeds not equipped with turn signals), made more difficult in braking situations because right hand is needed to control front brake, and mirror attached to handlebar (vibration causing reduced visibility). The machines tested depend on natural cooling of engines, except Cimatti and Vespa which have cooling fans. Oil mixed with gasoline, in proportions varying from 2% to 4%, is needed for models tested. Mopeds require a good deal of maintenance. Whatever the official rules, the mopedalist must, as a practical matter, behave more as a bicyclist than as a motorcyclist.

Publ: Consumers' Research Magazine v62 n1 p14-7, 20 (Jan 1979)
1979; 5refs
Availability: See publication

HS-024 907

MEDICAL CONDITIONS AND RISK OF COLLISION: A FEASIBILITY STUDY. FINAL REPORT

A pilot study was undertaken to ascertain the feasibility of a major study to determine the risk of involvement in a traffic

collision for various medical conditions. All the necessary data bases were examined from the points of view of completeness, accessibility, and comparability, in order to specify what medical conditions can be investigated reliably from a risk factors perspective, and to specify the parameters, procedures, and cost of such a major project. A synthesis and comparison were made of the relevant practices and procedures of the motor vehicle licensing agencies in all Canadian jurisdictions, especially as they pertain to licensing in general and to medical conditions in particular. The feasibility of conducting research on the risk of collision associated with various medical conditions was discussed. A bibliography is presented on medical conditions, organized according to various medical factors (vision, hearing, cardiovascular and cerebrovascular conditions, diseases of the nervous system (epilepsy, narcolepsy, other), metabolic diseases (diabetes, hypoglycemia), musculoskeletal disabilities, the aging driver, sudden illness and death at the wheel, various medical conditions), and licensing aspects (guides, manuals, criteria in assessment for licensure; program evaluation; conferences; related considerations). It was concluded that although risk-factor research is feasible and of some potential long-term utility, the methodological limitations as well as the excessive anticipated costs preclude it as a reasonable future exercise. One of the major barriers to such work is the difficulty associated with identifying and measuring so large a number of possibly relevant medical conditions. It is recommended that the Canadian Conference of Motor Transport Administrators (CCMTA) make available to interested parties this descriptive information on licensing procedures and medical reporting, that the Conference encourage as high a degree as possible of upgrading and standardization in the information that is recorded in all jurisdictions, and that the members stimulate the movement toward an explicit policy regarding conditions for access to and use of existing information systems for responsible research initiatives in the road safety area. The documentation pertinent to medical practices should be filed with the Canadian Medical Assoc. Com. on Emergency Services.

by H. M. Simpson; R. A. Warren; L. Page-Valin
Traffic Injury Res. Foundation of Canada, 1765 St. Laurent
Blvd., Ottawa, Ont. K1G 3V4, Canada
1977; 96p 344refs
Prepared for Canadian Conference of Motor Transport
Administrators.
Availability: Canadian Conference of Motor Transport
Administrators \$5.00

HS-024 908

FOG WARNING SYSTEMS ON ROADS

In view of the need for the Australian states (particularly Victoria and New South Wales) to consider carefully whether or not to install fog warning and/or guidance systems on their major highways, an outline discussion is presented on the subjects of fog formation, types of fog, periods of high probability and frequency of fogs, fog dispersal, and guidance and warning systems. Included are fog frequency/distribution tables for two Bureau of Meteorology stations (Mangalore Aerodrome, and Omeo Omeo) for respective periods of 1959-1975 and 1957-1975, and a graph of annual number of fog days in Melbourne, 1860-1973. It is concluded that the nature of the fog highway safety problem must be determined, that both the problem and control systems should be discussed among Australian Road Authorities, and that a system for achieving a higher degree of safety in fog conditions should be matched to the problem, giving consideration to both the cost and effec-

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tiveness of that system. Appended is a paper by R. F. Morris "Electronic Driver Aid Systems for Freeways" (pp292-6 of unidentified publication), which describes the electronic driver aid system being installed by the Dept. of Main Roads (N.S.W.) on the Southern Freeway between Waterfall and the Bulli Pass, and that proposed for the Sydney Harbour Bridge and approach freeways.

by R. S. Matthews
Country Roads Board (Victoria), 60 Denmark St. Kew, Vic.
3101, Australia
1977; 22p 4refs
Presented at Country Roads Board (Victoria) Divisional
Engineers Conference, 1977.
Availability: Corporate author

HS-024 909

DRIVER LICENSING IN KENTUCKY

The question of whether circuit court clerks in the State of Kentucky should continue to issue driver's licenses has been raised in view of the passage of the Judicial Article which established Kentucky's new Court of Justice, and related implementing legislation. The circuit court clerk now issues motor vehicle operator's licenses and motor boat licenses for the Kentucky Dept. of Transportation; other licenses are issued by county court clerks. In Jan 1978, the circuit clerk will become a state employee within the Court of Justice under the administrative control of the Chief Justice. Continuing the issuance of driver's licenses will mean that the executive function of driver licensing will be performed by an employee of the judicial system. The circuit clerk also will assume new responsibilities which include the clerical responsibilities for the district court as well as other new duties established during the 1976 Special Session of the Kentucky General Assembly. As a consequence, driver licensing will become one of an expanded list of circuit clerk tasks. An examination is presented of the statutory basis of the licensing system and the way in which the system functions; the changes in the office of circuit clerk; a number of issues related to the transfer of license issuance, including centralized licensing, planning for a computerized system, and some probable results of a transfer of licensing; the driver licensing fee system; and some alternative courses of legislative action and their implications. Appended are House Concurrent Resolution 26, 1976 Special Session, Kentucky General Assembly (directing the Kentucky Legislative Res. Commission to study Kentucky's driver licensing system), tables of state licensing fees collected by circuit and county clerks in Kentucky during 1975, and House Bill 12, 1976 Special Session, Kentucky General Assembly (advocating transfer of driver license issuance to office of county court clerk).

by Prentice Harvey
Kentucky Legislative Res. Commission, State Capitol,
Frankfort, Ky. 40601
Rept. No. RR-139; 1977; 61p 9refs
Availability: Corporate author

H

HS-024 910

SAFETY MEASURES FROM RESEARCH TO PRODUCTION [MOTOR VEHICLE SAFETY STANDARDS]

A discussion is presented of the full cycle of work carried out from research to production if a new motor design is to be reasonably likely to reduce the risk of accidents causing personal injury. The following subjects are brought about a new vehicle safety feature are outlined: accident studies, ideas for safety improvements, research to provide a better understanding of the subject, development of ideas, preparation of standards, and assessment of improvements in service. The role of England's Transport Research Lab. (TRRL) in developing safer motor vehicles is cited; among its contributions are the reduction of injuries in vehicle/pedestrian collisions, passive restraint, improved safety glass, and load-sensing valves to improve tractor-trailer vehicle braking balance and reduce the risk of jackknifing. Two examples of vehicle safety from research to production, involving TRRL, are provided in more detail: concern antilock motorcycle brakes, and side impact protection of passenger cars.

by I. D. Neilson
Publ: Automotive Engineer v3 n6 p35-8 (Dec 1978)
1978
Availability: See publication

HS-024 911

FUNCTION VERSUS APPEARANCE IN VEHICLE DESIGN

Papers are reviewed which were presented at a reception of Mechanical Engineers conference on the function vs. appearance in the design of motor vehicles. Representatives from Ford Europe, Birmingham, England; Leyland Res. Unit, Ford, Chrysler, BL (British Leyland), Volvo, Daimler-Benz, Freightliner, Motor Industry Assoc., Porsche, and Rolls-Royce, among others, discussed such topics as the relationship between the stylist and the engineering designer, safety criteria in vehicle design, constraints and requirements, influences on automotive future trends in vehicle interiors, meeting customer requirements, aerodynamics as a means to vehicle fuel economy, life cycle, the philosophy of design, and the role of the designer. The conference concluded that the dichotomy between engineering designer and stylist could best be solved by mutual training of emergent vehicle designers which would be about a true marriage of form and function. Future research was expected to be placed on aerodynamics, propulsion means (i.e. electric), and lighter, stronger materials.

Publ: Automotive Engineer v3 n6 p61-4 (Dec 1978)
1978
At head of title: Conference Report.
Availability: See publication

HS-024 912

INTEGRATED MOTORIST INFORMATION SYSTEM (IMIS) FEASIBILITY AND DESIGN STUDY. PART 1. GENERALIZED METHODOLOGY FOR IMIS

FEASIBILITY STUDIES. VOL. 1: IMIS FEASIBILITY STUDY HANDBOOK. FINAL REPORT

A methodology for performing a feasibility study for an Integrated Motorist Information System (IMIS) in any freeway corridor is presented in handbook form to provide practicing traffic engineers with a step-by-step procedure for accomplishing such a study. The IMIS concept is based on the premise that state-of-the-art equipment and real-time, traffic-responsive control techniques can be used for effective management of traffic in an existing highway network or corridor. By combining individual remedial measures in an integrated design, a more cost-effective system, capable of addressing a greater portion of the traffic-related problems, can be provided. The backbone of IMIS is an electronic surveillance subsystem, which provides the real-time data required to monitor and control traffic in a corridor. The electronic surveillance also provides an automatic incident detection capability for quick system reaction to problems. Other forms of manual surveillance may be incorporated, or integrated to improve system response. Coupled with surveillance and control functions, IMIS provides a comprehensive system of motorist information and services which includes variable message signs, highway advisory radio, motorist air/emergency, and trip information services. Major topics in the handbook include criteria for IMIS applicability, assembly of the necessary data base, selection and evaluation of candidate routes, equipment tradeoffs, development of alternative preliminary designs, and system evaluation on a benefit/cost basis. Although the handbook is not intended as a detailed design guide, it addresses subjects requiring design-related decisions, such as selection of communications media, alternate routes, diversion points, and ramp metering locations. As such, it should be of general interest to those concerned with freeway surveillance and control system design.

by P. Zove; C. Berger
Sperry Rand Corp., Sperry Systems Management, Great Neck, N.Y. 11020
DOT-FH-11-8871
Rept. No. FHWA-RD-78-23; GF-15-1005(NP); 1978; 267p refs
Rept. for Jan 1977-May 1978. Vol. 2, Validation and Application of Feasibility Study Handbook, is HS-024 913.
Availability: NTIS

HS-024 913

INTEGRATED MOTORIST INFORMATION SYSTEM (IMIS) FEASIBILITY AND DESIGN STUDY. PHASE 2: GENERALIZED METHODOLOGY FOR IMIS FEASIBILITY STUDIES. VOL. 2. VALIDATION AND APPLICATION OF FEASIBILITY STUDY HANDBOOK. FINAL REPORT

Results are presented of the application of a user-oriented, generalized methodology (in handbook form) for performing a feasibility study for an Integrated Motorist Information System (IMIS) to a test corridor in California, extending from downtown Los Angeles 25 mi eastward, and including three major east-west limited access facilities (San Bernadino Freeway, Pomona Freeway, and Foothill Freeway), and validation of the benefit assessment methodology contained in the handbook. Each step in the methodology was performed in its proper sequence and in accordance with handbook procedures. If a problem were encountered, the methodology was reviewed and revised as necessary. The application exercise proved to be quite useful in uncovering problems which

were not evident during the initial writing of the handbook. For example, the original route evaluation process was found to be somewhat inadequate for the real-world case. Other revisions included simplification of the trip length computation, clarification of control subnetwork definition, revisions in communications subsystem study, and clarification of the incremental benefit/cost analysis. The results of the simulation effort for validating the basic benefit relationships revealed that the handbook methodology can be expected to provide a reasonably accurate measure of system benefits. The overall conclusion of the study is that the handbook (as revised) represents a viable tool for conducting an IMIS feasibility study in any corridor. The present application of the handbook to a test corridor should provide a useful reference to users of the handbook, as it represents a complete example of a feasibility study.

by P. Zove; C. Berger
Sperry Rand Corp., Sperry Systems Management, Great Neck, N.Y. 11020
DOT-FH-11-8871
Rept. No. FHWA-RD-78-24; GF-15-1006(NP); 1978; 171p refs
Rept. for Jan 1977-May 1978. Vol. 1, IMIS Feasibility Study Handbook, is HS-024 912.
Availability: NTIS

HS-024 914

EDUCATIONAL APPROACHES TO DRIVER IMPROVEMENT: AN EXPERIMENTAL EVALUATION WITH NEGLIGENT DRIVERS. FINAL REPORT

In an effort to evaluate various approaches to driver improvement, 17,662 California drivers who had accumulated driver records severe enough to warrant their being notified to attend a standard Group Educational Meeting (GEM) were assigned to one of six treatments of a control group. The Negligent Operators (Neg Ops) were assigned to one of the following: standard GEM, three treatments which were modifications of GEM (changes in methods of conducting meetings, programmed-learning homework sent to Neg Ops before meetings, and Neg Ops who attended meetings and completed homework offered an incentive (point reduction) for future good driving), and two treatments not involving meetings (sending of programmed-learning material to Neg Ops who were told to return completed homework, and offer of the good-driving incentive for returning homework; the former treatment was designated HI, the latter HI/PRI). Subjects' driving records were examined for accidents and convictions during the one year following assignment to a treatment. Only HI/PRI showed significantly fewer accidents than the control, and that reduction was restricted to the second six months. When data for 6513 additional GEM and control subjects were combined with original data, GEM's accident mean was significantly below the control's during the first six months. Among meeting treatments, there was no advantage to increasing the length of classroom sessions nor did mandatory attendance (under threat of suspension) improve driving records. Data suggest that benefits were more related to the promise of the incentive than to its subsequent delivery. There was evidence that some meeting treatments and HI/PRI were more effective on drivers who had received prior warning letters (W/L's). Recommendations include continuing the GEM program, discontinuing use of mandatory GEM notice, not scheduling drivers without prior W/L's for GEM's but sending W/L's instead, validating research findings for HI/PRI, clarify-

ing or improving incentive treatment before implementing or studying it further, exploring methods of improving GEM's effectiveness in second six months, and modifying the Dept. of Motor Vehicle's postlicensing control reporting and evaluation system.

by William C. Marsh
California Dept. of Motor Vehicles, Res. and Devel. Section,
Sacramento, Calif. 95809
NHTSA-057402; NHTSA-057301
Rept. No. CAL-DMV-RSS-78-66; 1978; 187p 59refs
Availability: NTIS

HS-024 915

ARE YOU READY? [MOTORCYCLE ACCIDENTS, CAUSES AND COUNTERMEASURES]

A discussion is presented with the principal investigator of a Motorcycle Accident Cause Factors and Development of Countermeasures program sponsored by the National Hwy. Traffic Safety Administration. The information obtained in this study will be incorporated into the National Accident Sampling System (NASS) and used by ten currently-operating NASS accident investigation teams to reconstruct motorcycle accidents occurring in the U.S. The information generated by NASS teams will be made available to cyclists and safety specialists with the hope of producing better educated, more skillful riders. The motorcycle industry is also very much involved in the NASS program. The most important aspect of the program is thought to be training of local law enforcement personnel in motorcycle accident investigation techniques. Some findings of the multidisciplinary research program to date are that tattoos are a prime indicator of the risk-taking character of the individual; that touring riders have fewer accidents because their bikes usually have fairings and are bigger, brighter, and easier to see, because they usually do not commute in traffic and because they are more disciplined riders. It was found that most accidents occur at intersections, that the biggest factor in cycle accidents is exposure to traffic, that accident-involved cyclists do not wear eye protection, that helmets (even the most modest ones) will go a long way in providing protection; that police cyclists get hit as often as civilian riders; that more conspicuous cyclists do not get hit as often; that basic cycle courses do a lot of good; that alcohol involvement in fatal motorcycle accidents amounts to over 50%; and that the biggest cause of motorcycle accidents is a car turning left in front of the cycle from either the opposing flow or the lane on the right.

by Don R. Holt
Publ: Driver v12 n7 p0-1, 3-9 (Dec 1978)
1978
Availability: See publication

HS-024 916

THIRTY-NINE STATES NOW HAVE SPECIFIC LAWS FOR MOPEDS

A recent study by the Moped Assoc. of America shows that 39 states now have specific laws governing mopeds. A majority of the states have 16 as the minimum age for moped operation; ten states allow 15-year-olds to operate mopeds. Of the "moped" states, 37 do not require special operator's licenses, and 85% accept any valid driver's license for moped operation. All moped states but one (Maryland, which limits engine size

to 1.5 hp, creating a mechanical limit of 25 mph) clearly specify a speed limit; more than a third limit speed to 25 mph. Out of 10 of the most recent states to enact moped laws chose 30 mph as the limit. Only one of the states (New York) classifies the moped as a "limited-use motorcycle"; all the others define the vehicle as some form of motorized bicycle or simply as a "moped". Virtually all of the states describe the moped as having a small motor, operable pedals, and an automatic transmission. All mopeds are forbidden to travel on interstate highways. There is general agreement among the states that registration fees for mopeds should be waived or nominal. Of the 23 states requiring registration, about half charge \$5 or less annually. No mandatory liability insurance is required by 90% of the states, although 14 states require proof of financial responsibility in the event of an accident. Only Georgia requires mandatory helmet use; two other states have some helmet requirements for some mopeds and some operators. Most of the states set some kind of engine limit (15 hp, 14 setting limit of 1.5 hp, and 4 imposing a 1 hp limit); the six states with no hp limits set speed limits varying from 20 mph to 30 mph. All but eight states specify maximum piston displacement of engines, more than 93% having chosen 50 cc. All mopeds in the U.S. must be equipped with a headlamp, taillamp, stoplight, a network of reflectors, a rearview mirror, a strong brake system, and an extra switch to shut down the engine. Eight of the 12 states without specific moped laws are contiguous with each other in the Northwest; three-fourths of the nonmoped states are in the bottom half of the state population rank; mopeds are presently permitted to travel in all these states provided they conform with existing motorcycle laws.

Publ: Traffic Safety v78 n12 p21, 31 (Dec 1978)
1978
Availability: See publication

HS-024 918

UNSAFE BRIDGES

Initiation of the Federal Hwy. Administration's (FHWA) nationwide bridge inspection program, as provided for in the Federal-Aid Highway Act of 1968, revealed the great extent of deterioration of bridges on U.S. roads. FHWA says that one of the country's major highway problems is the condition of its bridges. The FHWA's bridge design and inspection branch categorizes inadequate bridges as either structurally deficient or functionally obsolete. A structurally deficient bridge has a defect that has caused it to be restricted to light vehicles or must be closed. A functionally obsolete bridge is one whose design geometry, load-carrying capacity, clearance, or approach roadway alignment no longer can safely service the system of which it is an integral part. Out of the 234,000 bridges on the Federal-aid-highway system, about 33,500 were found to be inadequate (6,900 structurally deficient, 26,500 functionally obsolete). As a means of dealing with the problem, Congress created the Special Bridge Replacement Prog. in 1970. Funds were supplied for the replacement (not repair) of deficient bridges on the Federal-aid system. By the end of 1977, work on 1,648 bridges had been approved and funded (approximately one-third now open to traffic). To help decide which bridges should be replaced first, FHWA is working with state highway departments on assigning a rating to each bridge, based on structural soundness, safety, and necessity for public use. A major problem is that the funds allotted for bridge replacement do not apply to approximately 70,000 deficient bridges outside the Federal-aid system. Many of these bridges in rural areas

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are the only bridges for miles around. The FHWA has been giving support and advice to state and local efforts to upgrade these bridges, and the Dept. of Transportation has recommended to Congress that states be allowed to use up to 30% of their bridge allocations for work on these bridges. It was also recommended that the existing replacement program be expanded to include rehabilitation, and that the Federal share of bridge-replacement costs be increased from 75% to 80%.

by Elliott Himelfarb
Department of Transportation, Office of Public and Consumer Affairs, Washington, D.C. 20590
Publ: Traffic Safety v78 n12 p8-9, 28 (Dec 1978)
1978
Reprinted from Transportation U.S.A., Summer 1978, published by Dept. of Transportation.
Availability: See publication

HS-024 919

NEIGHBORHOOD TRAFFIC CONTROLS

A nontechnical overview, from the local government perspective, of issues and problems associated with neighborhood traffic controls is presented. Neighborhood traffic controls embrace a wide variety of techniques and devices that are designed to reduce the volume and speed of vehicle movements in residential areas. The nature of the problem, control techniques, and research needs are outlined. A planned approach to neighborhood traffic controls in St. Louis, Mo., and an old approach to traffic controls in University City, a community adjoining St. Louis, are described as examples. Contacts and current programs at the Federal Hwy. Administration in connection with neighborhood traffic controls are listed, and a brief annotated bibliography is provided. It is indicated that a more systematic approach to traffic controls requires better data on the impact of traffic in neighborhoods and of changing neighborhood composition; better understanding of the effect of local traffic controls on adjoining neighborhoods and on regional land use and transportation plans; better documentation of traffic control techniques in a form suitable for use by public officials and citizens; and cooperation between traffic engineers and other practitioners to provide safety and system continuity in traffic control design.

Public Technology, Inc., 1140 Connecticut Ave., N.W., Washington, D.C. 20036
1978; 22p 6refs
Urban Consortium for Technology Initiatives, Transportation Task Force, Information Bull. Supported by Dept. of Transportation.
Availability: NTIS

HS-024 920

SEAT BELTS: SAFETY IGNORED. DRAFT REPORT

The use and non-use of seat belts and the relevance of such practices to automobile passenger safety are discussed. Literature reviewed covers the percentage of current use, psychological and physiological variables, voluntary and compulsory belt use programs, and the effectiveness of seat belts in reducing the severity of injuries and the incidence of fatalities. The use of seat belts in the U.S. is currently somewhat low, estimated from 14% to 20%, although people use belts more in situations where they perceive the risk of accident to be greatest. The problem remains that in spite of impressive statistics on the efficacy of seat belts, there is a lack of a means to promote

voluntary belt usage, and mandatory seat belt use laws lack popular support. The major difficulty in increasing belt use is overcoming the human obstacles of laziness, forgetfulness, and bad habits. In addition, belt design should encourage use. While seat belt use could significantly improve automobile safety, there is a need for information and education campaigns to educate people about the chances of their being involved in an accident and about the efficacy of seat belts in reducing the chances of death and injury from traffic accidents. If used now, seat belts could save the lives of from 10,000 to 15,000 people in the U.S. per year. It is possible that past seat belt promotion campaigns have been unsuccessful due to faulty design and that a well-designed and continuous campaign could affect people's behavior in using seat belts. Mandatory belt use laws and/or passive restraints should also be accompanied by education and information campaigns.

by Gary D. Hales; Robert K. Young; Martha S. Williams
University of Texas at Austin, Council for Advanced Transportation Studies, Austin, Tex. 78712
(77)-7200-02-B
Rept. No. RR-52; 1978; 56p 86refs
Sponsored by Texas Office of Traffic Safety.
Availability: Corporate author

HS-024 921

AGE-RELATED FACTORS IN DRIVING SAFETY. DRAFT REPORT

The relationship of driver age to accident rate is reviewed through the literature, covering studies which consider such causative or confounding variables as experience, exposure rates, hazard miles driven, alcohol, personality, sensory decrements, medical problems, police bias in reporting, and inadequate socialization processes. Accidents in the industrial setting also are considered. Traffic accident and violation rates are higher for older (over 60) and younger (under 30, but particularly the 18- and 19-year-old male) drivers, and studies suggest different processes at work for older vs younger drivers. Alcohol is considered especially detrimental to youth's driving performance, as are the personality factors of less maturity and aggression. Critical factors in older drivers appear to be changes in sensory capacity, reaction times and short-term memory. Older drivers also have a decreased survival and recovery ability when accidents occur. For prevention strategies, many researchers suggest increased educational efforts or stricter testing and licensing standards to counter age-related driving problems.

by Deborah Valentine; Martha Williams; Robert K. Young
University of Texas at Austin, Council for Advanced Transportation Studies, Austin, Tex. 78712
(77)-72-00-02-B
Rept. No. RR-53; 1978; 67p 65refs
Sponsored by Texas Office of Traffic Safety.
Availability: Corporate author

HS-024 922

MAJOR ENGINEERING APPROACHES TOWARD INCREASING PEDESTRIAN SAFETY

Some major findings are highlighted of a recent Federal Hwy. Administration research project on engineering approaches to enhance pedestrian safety and to pinpoint specific countermeasures in urban, rural, and suburban areas, with special attention directed to problems of pedestrians on freeways. Results

of studies in urban areas indicated that median barrier countermeasures affected behaviors associated with dart-out (first and second halves) and pedestrian-strikes-vehicle types of urban pedestrian accidents, midblock crosswalk affected dart-out (second half) behavior, diagonal parking and meter post barriers affected dart-out (first half), stop-line relocation affected multiple-threat-type accident behavior, and bus-stop relocation affected bus-stop-related-type accident behavior. Of 11 possible countermeasures developed for pedestrian problems at urban intersections two were studied intensively: improved signal timing, and improved pedestrian signal messages, color, and displays. It was found that the standard 7-sec minimum WALK interval is long enough to accommodate pedestrian queues under most conditions, that the minimum clearance interval depends on the number of pedestrians using the crosswalk, and that serious consideration should be given to allocating extra time in the cycle to the WALK vs. DONT WALK phase. It was determined that the Hand/Walking Man symbol display is a significant improvement over standard DONT WALK/WALK display; that Standing Man/Walking Man is as effective as standard display; that the Circle Slash/Walking Man is not as effective as standard display; that compliance with orange and white vs. red and green signal indication colors was significantly higher; that an educational program will be needed for elementary school children if symbolic pedestrian symbols come into use; and that there is a need for further research on optimal clearance indication and means of alerting drivers and pedestrians to turning-vehicle conflicts. It was concluded that no single countermeasure is likely to have an impact on a high percentage of rural and suburban pedestrian accidents. Information is tabulated on countermeasures expected to affect 8% or more of rural/suburban accidents, the most effective being improved roadway markings and lighting, and sidewalks/paths. The same conclusion holds for freeway pedestrian accidents (spot treatments for very site-specific locations indicated). A sample page is provided of the user's manual from the Model Pedestrian Safety Program, a six-step cyclic process to be used as a guide for communities for solving local pedestrian safety problems.

by John C. Fegan
 Publ: Public Roads v42 n3 p85-90 (Dec 1978)
 1978; 15refs
 Availability: See publication

HS-024 923

IMPROVING URBAN TRAFFIC THROUGH TRUCK-ORIENTED MEASURES

The effects of commercial trucks on urban traffic are discussed with emphasis on short-range improvements in traffic through truck-oriented measures. It appears that moving trucks are not substantial contributors to delay in most urban traffic systems. Only in isolated circumstances, where trucks encounter unusual conditions (e.g. short, steep upgrades or restricted maneuvering space) are there traffic-related reasons to control truck movements. Congestion resulting from the loading and unloading of trucks at curbside in central business districts is the most severe problem. Some long-term improvements in loading and unloading operations that most often have been proposed include consolidated receiving, consolidated truck terminals, improved vehicle design, offstreet loading, separation of function, and more effective enforcement of parking and loading restrictions. Short-term improvements should concentrate on eliminating double parking and reducing interference due to trucks entering and leaving curb-

side spaces. The Federal Hwy. Administration's major research project on Metropolitan Multimodal Traffic Management is investigating large, areawide traffic analysis and control measures and has identified the following five areas for study: accurate data collection and development of models of the operations of trucks at curbside; effective measures for cities to encourage consolidated receiving operations; feasibility of operating trucks only at night, or at least during off-peak hours; systematic truck routing; and green light extension systems for trucks.

by Paul Ross
 Publ: Public Roads v42 n3 p91-8 (Dec 1978)
 1978; 37refs
 Availability: See publication

HS-024 924

DRUGS, DRIVING AND THE LAW: A PROSPECTIVE REVIEW

As a rationale for legislation defining "driving under the influence" in terms of drugs besides alcohol, the following basic questions are addressed. Do drugs affect driving performance in such a way as to cause accidents? Is there currently an accurate analytical system capable of detecting and measuring small amounts of drugs found in biological specimens? If so, can legislative controls be initiated at this time in a fashion similar to those for alcohol? Is there in fact a drug-driver problem today and if so, to what extent? Studies are reviewed on the effects of drugs (minor tranquilizers, sedative-hypnotics, marijuana, stimulants, drugs and alcohol) on driving skills, research on analytical methods to detect and measure drugs in blood and urine, epidemiological studies on drug-related traffic accidents, and problems to be solved before drug-driving legal countermeasures can be taken. It is pointed out that any analytical screening method for impaired drivers must be comprehensive, sensitive, accurate, reliable, and specific. It is concluded that the present state of physiological and analytical science is not yet sufficiently advanced to permit an intelligent formulation of any new drug-driving laws. The pharmacokinetics of drugs are more complicated than those of alcohol; absorption rates, intoxication rates, interdrug reaction, and drug interaction with alcohol tend to make legal countermeasures more difficult. Use of gas chromatography, mass spectrometry, and immunoassays may make drug screening of drivers possible.

by Rochelle D. Schwartz; Victor H. Cohn; Fred P. Abramson
 Publ: Contemporary Drug Problems v6 p283-306 (Fall 1977)
 1977; 43refs
 Availability: See publication

HS-024 925

BRAKE REACTION TIME--EFFECTS OF AGE, SEX, AND CARBON MONOXIDE

Simulated braking responses have been tested in relation to blood carboxyhemoglobin (HbCO) levels of volunteer subjects in two separate studies. In a field survey at the Western Fair in London, Ontario, 352 subjects participated in an experiment that comprised a rebreathing estimate of blood HbCO, completion of a questionnaire relating to age, occupation, home location, and driving and smoking habits, as well as performance of the braking response test using a brake reaction testing device. The main source of variance in the HbCO levels was

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recent smoking. When allowance had been made for this factor, there was little relationship between the percentage of HbCO and the reported time spent in an urban environment or in driving urban roads. In women, the brake response time deteriorated from age 16; but in the men, there was an improvement from age 16 to early 20's. Times at all ages were better for men than for women. Average response times and the rate of aging of the braking response were very similar in smokers and nonsmokers. In the nonsmokers, however, response times were inversely correlated with the square of the percentage of HbCO. Three series of laboratory measurements of brake response time and its movement and reaction time components were also performed. Immediate, longer term, and more prolonged reactions to exposures of carbon monoxide (CO) were recorded using three groups of non-smokers. The studies showed no change of total response time with step function CO increments of as much as 7% HbCO. The experiments confirm that with levels of CO likely to be encountered in the urban environment, any change in the total braking response time is small and of no practical significance. The breakdown of the response into its two components also revealed no significant effects, although possibly pointing toward an increase in reaction time and a decrease of leg movement time during the first few minutes after CO exposure.

by G. R. Wright; R. J. Shephard

PR-183

Publ: Archives of Environmental Health v33 n3 p141-50 (May-Jun 1978)

1978; 27refs

Parts presented as doctoral dissertation by G. R. Wright, Univ. of Toronto.

Availability: See publication

HS-024 926

VINTAGE YEAR FOR EV'S [ELECTRIC VEHICLES]

For electric vehicle (EV) proponents, 1978 has been a successful year. General Motors announced its intention to market production EV's in the mid-1980's; the company is working on delivery vans and small commuter cars, and is developing a nickel-zinc battery to provide the energy density needed to give the vehicles a 100-mi range and 50-mph speed. General Electric (GE) announced the establishment of an Electric Vehicle Systems Operation within its Industrial Control Dept. which can supply complete propulsion packages for EV's, vans, and buses. The Dept. of Energy (DOE) has awarded major research and development (R and D) contracts to the Jet Propulsion Lab. (JPL) (vehicle systems), Lewis Res. Center (propulsion system), Argonne National Lab. (battery), and Lawrence Livermore Lab. (flywheel). JPL takes delivery in 1979 of two EV's designed especially for R and D purposes, one being built by GE and Chrysler, the other by Garrett AiResearch. DOE is also sponsoring EV demonstration projects to be carried out by private companies and Federal agencies. Four small companies (South Coast Technology Inc., Jet Industries, Electric Vehicle Associates Inc., Batronic Truck Corp.) have recently been awarded contracts by DOE through its R and D administrators to build and deliver EV's by Feb 1979; the companies have been directed to use off-the-shelf technology and components that are at least in limited production. Four companies (Centro Ricerche Fiat (Italy), GE Minicars Inc., South Coast Technology Inc.) have also been chosen to design vehicles powered by a combination internal combustion engine/electric motor propulsion system (hybrid vehicles). A separate note illustrates two basic types of hybrid

configuration: series (all traction power provided by electric motor) and parallel (both electric and internal combustion systems supply motive power). Also illustrated is the Copper Development Assoc. (CDA) four-passenger EV, weighing 2100 lbs, with a top speed of 59 mph and a range of 79 miles. The fiberglass reinforced polyester body is mounted on a chassis of steel tubing. The vehicle carries 12 6-V batteries with common venting and a single-point waterfill system. The car has front wheel drive, drum brakes, and independent four-wheel suspension. Power is transmitted through a Morse chain to a helical final-drive gearset. The GE "Centennial Electric" is also illustrated, a heavier (3250 lbs) four-passenger car with a shorter range (45 miles). It is a front-wheel drive with a 24-hp GE series-wound traction motor, powered by 18 6-V batteries.

by Clare E. Wise

Publ: Machine Design v50 n28 p40-2, 44-5 (7 Dec 1978)

1978

Availability: See publication

HS-024 927

THE ROLE OF THE STATE HIGHWAY SAFETY AGENCY IN MANAGING A STATE'S HIGHWAY SAFETY PROGRAM: CRITERIA FOR PERFORMANCE AND SUCCESS

Activities are reported of a summer workshop on the role of the state highway safety agency (SHSA) in managing a state's highway safety program in order to focus critical attention on the SHSA's and to emphasize needs and opportunities within the agencies. Topics under discussion included the origin of SHSA's, factors associated with success and failure in the first decade of their operation, necessary functions for successful operation (a model SHSA), and the duties and qualification standards of SHSA staff members. The workshop concluded that the capability to identify and solve their own highway safety problems varies widely among the states, that in most states, the SHSA is not a major force in developing state highway safety policy nor in implementing highway safety programs, and that no single factor has accounted for either the success or failure of SHSA's. It is recommended that the original description (in the national legislation) of the SHSA needs clarification in order to create a clear, certain role for SHSA's in practice; that statutory specification is required for the structure and authority of SHSA's within the states; that national highway safety programs and policies should be coordinated to provide unified guidance and assistance; and that SHSA's should strengthen their internal organization and management practices by developing capabilities to provide comprehensive program management, programmatic specialties (driver/vehicle/highway), planning, effectiveness evaluation, data processing and analysis, budget and fiscal analysis, public information and education, and field services to local jurisdictions, to develop competence in in-depth crash investigations, and to establish a university-affiliated center for highway safety training.

by Wayne S. Ferguson, ed.

Publ: Tran Res Circular n197 pi-27 (Dec 1978)

1978; 35p refs

Rept. of workshop sponsored by Transportation Res. Board, Com. on Planning and Administration of Transportation Safety, Warrensburg, Mo., 27-29 Jul 1977.

Availability: TRB

HS-024 928

PERCEIVED AND ACTUAL COSTS OF OPERATING CARS

A sample of 60 London car commuters was interviewed to determine how they perceived journey-to-work costs in general and fuel costs in particular, how the perceived fuel costs compared with actual fuel costs, and what perception patterns and mechanisms were at work. The average perceived cost for the sample (5.2 pence) was significantly greater than the average actual (3.3p) and average cold-start (3.8p) costs, in spite of the fact that 87% of the sample overestimated their cars' mileage per gallon, probably by adopting published figures for overall road conditions. This inconsistency agrees with the findings that most people do not base their cost estimates on consumption, and that the minority of car commuters who do underestimate costs use consumption in their estimations. Cost perception improves significantly with journey distances (possibly only over a certain threshold of four to six miles); and for journeys of six miles or more, journey cost is perceived with reasonable accuracy. Most people base their estimate on some notion of how much fuel they regularly buy and what portion is used in commuting to work. The ratio of fuel consumed in commuting to total usage was estimated for about half the sample and was found to vary from under 0.2 to 0.85 with the smaller ratios being associated with shorter distances. Ratios as high as 0.85 are due in part to second cars (whose ownership is itself positively correlated with commuting distance) being used for nonwork journeys. The dominant perceptual mechanism and the wide spread of ratios suggest one reason why cost perception improves with distance. Short distance commuters overestimate the journey to work use of the car, probably because it stands out as being regular and twice daily. They typically attribute a third or a half of total fuel expenditure to the job trip which actually consumes only a quarter or a fifth. Long-distance commuters have a better gauge for estimating costs, since the trip is considerable both in its own right and in relation to overall mileage. Costs can therefore be estimated accurately through the fuel-buying mechanism.

by Andrew M. Malecki
 Publ: Transportation v7 n4 p403-15 (Dec 1978)
 1978; 5refs
 Availability: See publication

HS-024 929

MICHIGAN TRANSPORTATION RESEARCH PROGRAM. ANNUAL REPORT FOR FISCAL YEAR 1977-1978

The second year's (FY 1978) committee and staff activities and projects of the Michigan Transportation Res. Prog. (MTRP) are described. MTRP is an inter-university, inter-industry organization designed to support the research and demonstration program formulations and evaluations of the Michigan Dept. of State Highways and Transportation and other elements of state government. Program activities and proposals for the fiscal year concerned the Bureau of Urban and Public Transportation's demonstration and development programs, transportation energy, auto and passenger train service to northern Michigan and the Upper Great Lakes, small bus safety, life cycle cost procurement of small buses, Battle Creek rail relocation and downtown revitalization, airports development management data system, and public transporta-

tion for mobility-limited persons. MTRP study involved models for projecting future small bus fleetments in Michigan, bus tire procurement alternatives, plications of van and car pooling, an assessment of a fuels use by Michigan public transit, the use of di systems in public transit, intercity bus industry, p roles for the private sector, motor oil recycling and r "level of service" methodology for evaluating public tation services. Federal funding opportunities and ac summarized.

by L. E. Newland
 University of Michigan, Michigan Transportation Res.
 Ann Arbor, Mich. 48109
 77-1656
 Rept. No. UM-HSRI-78-45; 1978; 92p 30refs
 Rept. for 1 Oct 1977-30 Sep 1978. Sponsored by Michi
 State Hwy. Commission.
 Availability: Corporate author

HS-024 930

SLED TEST EVALUATION OF A WHEELCHAIR RESTRAINT SYSTEM FOR USE BY HANDICAPPED DRIVERS

Four sled impact tests were performed to evaluate wheelchair restraint device developed by Creative Inc., for use by handicapped drivers. Two tests were conducted using a 5th percentile female dummy and a 50th percentile male dummy. For each dummy, head-on and 33 degrees oblique impact were performed. Impact pulse was 20 mph and 16 G's for all tests. Wheelchair restraint was effective in restraining the dummies in all tests, but the dummies underwent extensive head and consequent head excursions because of the lack of upper-torso restraint. Results also indicated that a forward placement of the lap belt anchor would prevent large knee excursions observed in the tests. Recommendations for an upper torso restraint include a Y-yoke anchored to the vehicle (van) ceiling with clips attaching to wheelchair seat frame, or a modified wheelchair frame would enable the upper torso restraint to be anchored to wheelchair itself.

by Lawrence W. Schneider; John W. Melvin
 University of Michigan, Hwy. Safety Res. Inst., Ann Arbor, Mich. 48109
 Rept. No. UM-HSRI-78-57; 1978; 23p
 Sponsored by Dept. of Health, Education, and Welfare
 Prepared for Univ. of Michigan Rehabilitation Engineering Center. Special rept. for Jun-Oct 1978.
 Availability: Corporate author

HS-024 931

IMPACT TESTING OF RESTRAINT DEVICES WITH HANDICAPPED CHILDREN IN BUS SEATS AND WHEELCHAIRS. FINAL REPORT

A series of 16 sled impact tests was conducted to evaluate the effectiveness of restraint devices and currently being used in the State of Wisconsin for the handicapped child either in school bus seats or wheelchairs. An impact pulse of 20 mph and 16 G's were used for all tests. Eight tests involved wheelchairs in forward and side-facing orientations for head-on and 33 degrees oblique impacts. Another eight tests involved forward

bus seats for head-on and 33 degrees oblique impacts. In all wheelchair tests, a dummy was restrained to the chair by a Collins Saf-T-Straint. Two methods of restraining the wheelchairs to the bus were tested: the Collins Saf-T-Lock, which is bolted to the bus floor and holds the wheelchair by gripping the rear wheel rims between the steel structures by two steel pins; and safety belts (Ruppert Industries) anchored to the bus wall and wrapped around the front of the wheelchair. The four types of bus seat restraints tested were the Ruppert E-Z-On Harness, the Easy Way Dubl-Life Saver Restraint Vest, the Ford Tot Guard, and the Ortho-Kinetics Travel Chair. The results generally point out the ineffectiveness of many currently used protection devices and systems in the event of a bus collision. In six of the eight bus seat tests, the dummy's head struck the back of the bus seat in front. The practice of placing wheelchairs in a side-facing orientation is a poor one for the protection of children. Further consideration is needed for emergency egress of handicapped children in accidents involving fire or the threat of fire.

by Lawrence W. Schneider; John W. Melvin
University of Michigan, Hwy. Safety Res. Inst., Ann Arbor, Mich. 48109
DRDA-78-1659-J1
Rept. No. UM-HSRI-78-52; 1978; 82p 4refs
Rept. for 23 Jun-30 Sep 1978. Sponsored by Wisconsin Bureau of Crippled Children.
Availability: Corporate author

HS-025 086

ENGINE AIR CONTROL--BASIS OF A VEHICULAR SYSTEMS CONTROL HIERARCHY

Recent improvements in digital microprocessor hardware gave impetus to synthesizing a coherent set of heretofore impractical engine systems control laws. Algorithms for control of air-flow, exhaust gas recirculation, and spark advance were specially formulated to decouple the usual transient interactions among these variables and engine torque, fuel consumption, exhaust emissions, and driveability. A real-time driver/vehicle model, incorporating analog electronics on an engine dynamometer, was developed to allow accurate transient calibration of an experimental engine/transmission and its digital controller. Replicate, transient, cold-start Federal Test Procedure vehicle driving cycles were "driven" between perturbations to the controller calibration parameters. A Transient System Optimization procedure applied continuously over the Federal urban driving schedule, including cold start, validated the postulated control laws.

by Donald L. Stivender
General Motors Res. Lab., Engine Res. Dept., Warren, Mich.
Rept. No. SAE-780346; 1978; 35p 35refs
Technical Paper Series. Presented at Congress and Exposition, Detroit, 27 Feb-3 Mar 1978.
Availability: SAE

HS-025 087

LEGAL AND ADMINISTRATIVE ACTIONS TAKEN AGAINST AT-FAULT DRIVERS INVOLVED IN FATAL TRAFFIC CRASHES

A summary is presented of an exploratory study of legal and administrative actions taken against 2361 surviving drivers who had been involved in fatal traffic accidents in Michigan during 1972. The objectives were to assess the capability of centrally-

maintained traffic record systems to provide data on legal and administrative actions taken against at-fault drivers, and to estimate the frequency with which at-fault drivers in fatal crashes were charged, adjudicated, and sanctioned. The study revealed that in Michigan, for 1972, the central record systems could not provide the needed data, apparently because courts of record did not report the dispositions of traffic cases to the Michigan Dept. of State. As a result, the study was broadened to examine other record systems to address the second objective. The review of accident reports, centrally-maintained criminal records, and locally-maintained court records indicated that one driver in four who was involved in a fatal crash could have been charged with a felony (manslaughter or negligent homicide), that one in twelve actually was charged with a felony, that only one in twenty-four was convicted of a felony, and that, of those convicted, only half had their convictions entered on their driving records. Most drivers involved in fatal crashes were summoned for reexamination by the Dept. of State, the driver licensing authority in Michigan, and license revocations or suspensions were more frequent in cases of at-fault drivers.

by Paul A. Ruschmann
Publ: HSRI Research Review v9 n9 p18-23 (Sep-Oct 1978)
1978; 1ref
Sponsored by National Hwy. Traffic Safety Administration, and Motor Vehicle Manufacturers Assoc.
Availability: See publication

HS-025 088

RESEARCH ON MATHEMATICAL MODELS RELATING TO THE MOTOR VEHICLE TRANSPORTATION SYSTEM

Study methods and findings are summarized for a multipart research program which has been conducted since 1976 by the Hwy. Safety Res. Inst. concerning mathematical models relating to the motor vehicle transportation system. A descriptive inventory of 78 such models has been compiled and published. Two models that have been used extensively in Federal policymaking, the Wharton EFA Automobile Demand Model and the Faucett Automobile Sector Forecasting Model were selected for in-depth analysis. The report on the analysis of the Wharton EFA model will soon be published. A study of applications of the Wharton EFA in Federal policymaking has also been completed. The forecasting behavior of the EFA model, as studied by using simulation experiments over the period 1960-1974, showed that the trends in new car sales, scrappage, and vehicle miles traveled are predicted fairly well, but that the actual levels of these variables are not forecast with much accuracy. The model in general is better at tracking the historical record over the second half (1968-1974) of the full sample period than over the first half, a notable exception to this being total annual scrappage. The investigation of the applications of the EFA model produced information on the specific uses of the model by various agencies (most extensive use by the Dept. of Transportation, including 1981-1984 fuel economy standards, the President's proposed gasoline tax related to fuel consumption, gas guzzler tax and companion fuel economy rebate, the air bag, and the impact of introducing electric vehicles). Two important findings concerning the nature of the EFA model use are that the model frequently has been used by persons who lack extensive knowledge of its limitations or how it operates, and that results of the applica-

tions of the model often have been presented without reference to the accuracy of the model forecasts.

by Barbara C. Richardson

Publ: HSRI Research Review v9 n9 p24-9 (Sep-Oct 1978)

1978; 8refs

Sponsored by Motor Vehicle Manufacturers Assoc.

Availability: See publication

HS-025 089

REDUCTION OF ADVERSE AERODYNAMIC EFFECTS OF LARGE TRUCKS. VOL. 1: TECHNICAL REPORT

The first phase of a study to develop methods to minimize the adverse aerodynamic and splash and spray effects caused by large trucks on the highway is presented. This phase included analyses, laboratory experiments, wind tunnel tests, and full scale tests with trucks and devices; the second phase will involve a limited over-the-road field evaluation. An analytical methodology was developed and used to characterize aerodynamic flow, truck splash and spray generation and propagation, adjacent driver visibility factors, the performance of the disturbed adjacent driver/vehicle system, and benefit/cost comparisons. Attention was focused on understanding the phenomena, as well as on identifying and developing devices, techniques, and procedures for minimizing the aerodynamic effects. Several truck mounted devices and prototype concepts are identified which have the potential to alleviate the adverse effects of splash and spray in a cost-effective way. These include collector flaps, simple fenders, and aerodynamic panels and devices near the tractor, under the truck, and around the wheels. Non-vehicle means of alleviation are also considered. These include driver training, traffic control mechanisms (speed controls, lane-usage controls, warning signs, improved roadway delineation and highway maintenance procedures), and highway design changes (improved drainage, wind barriers, wider lanes, and route location and orientation).

by David H. Weir; Jay F. Strange; Robert K. Heffley
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Hawthorne, Calif. 90250; AeroVironment, Inc., Pasadena,
Calif.; Western Hwy. Inst., San Bruno, Calif.; Alan M.
Voorhees and Associates, Inc., McLean, Va.

DOT-FH-11-9165

Rept. No. TR-1093-1-Vol-1; 1978; 380p 73refs

Interim Rept. for Nov 1976-Sep 1978. Subcontracted to
AeroVironment, Inc., Western Hwy. Inst., and Alan M.
Voorhees and Associates, Inc. Vol. 2 is HS-025 090. See also
HS-025 091, HS-025 092, and HS-025 093.

Availability: NTIS

HS-025 090

REDUCTION OF ADVERSE AERODYNAMIC EFFECTS OF LARGE TRUCKS. VOL. 2: DETAILED SPLASH AND SPRAY DATA

As part of a study to develop methods to minimize the adverse aerodynamic and splash and spray effects caused by large trucks on the highway, two sets of splash and spray tests were carried out. The first set, performed in Jun 1977, emphasized various vehicle types; the second set in Nov 1977 focused on splash and spray devices mounted on the basic truck configuration. Both tests were run at the Firestone Test Center, Fort Stockton, Tex. Tabulated and photographic details of the data

are presented. Two kinds of data were obtained in the first set, i.e. those for the Truck-Alone Tests and those for the Adjacent Vehicle Tests. The Truck-Alone Tests described the wind, laser and photometer visibility measures, camera data and trackside observer ratings. Data were collected on such items as direction of travel, truck configuration, semitrailer load, ambient wind direction and magnitude, relative wind, truck speed, distance of truck from track centerline, maximum visibility redirection and visibility ratings from trackside observers, both ahead of and behind the truck. The Adjacent Vehicle test results include data on truck configuration, direction, ambient wind, truck speed, car speed, relative car/truck speed, water depth, task difficulty and accident risk ratings given by the driver after the run, and observer's visibility rating. For the second set of splash and spray tests, emphasizing various devices, only Truck-Alone data were obtained. In this set of results the truck and load description were replaced by a truck plus devices code, and the trackside observer visibility ratings were not made.

by David H. Weir; Jay F. Strange

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Voorhees and Associates, Inc., McLean, Va.

DOT-FH-11-9165

Rept. No. TR-1093-1-Vol-2; 1978

Interim Rept. for Nov 1976-Sep 1978. Subcontracted to
AeroVironment, Inc., Western Hwy. Inst., and Alan M.
Voorhees and Associates, Inc. Vol. 1 is HS-025 089. See also
HS-025 091, HS-025 092, and HS-025 093.

Availability: NTIS

HS-803 534

55 MPH MODEL PLAN FOR PUBLIC COMMUNICATIONS

This 55 MPH Model Plan for Public Communications provides a structure for designing campaigns to reach critical audiences in order to increase voluntary compliance with the national maximum speed limit. The Plan lists a number of possible target populations (divided into various categories of the driving population, public officials, media personnel, and support groups), and tabulates their importance, appropriate themes and appeals (information to convey), spokespersons, media/channels/vehicles, intended results, and methods of measuring results. The plan is intended only to indicate the range of possibilities for a 55 mph public communications campaign. The specific target audiences for which communications plans are suggested are as follows: young drivers, older drivers, commuters, high-mileage drivers, truck drivers, vacationers, drivers now complying with 55 mph, Citizen's Band radio users, bus drivers, state employees, police, judges, legislators, media personnel, medical profession, lawyers, trucking companies, bus companies, Teamsters Union officials, corporations, insurance companies, automobile clubs, and service and civic organizations. Appended are a sample request for proposal for 55 mph public opinion research, and charts for separately cross-referencing target audiences by media/channels/vehicles, spokespersons, and themes. Duplicate charts (in cardboard) called "55 Planner Scanners" are included in a special pocket at end of guide, to be used in planning sessions.

National Hwy. Traffic Safety Administration, Office of Driver and Pedestrian Programs, Washington, D.C. 20590

1978; 45p

Availability: Corporate author

HS-803 538

TRAFFIC SAFETY '77. A DIGEST OF ACTIVITIES OF THE NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION

Excerpts are presented from the annual reports for 1977 as individually required by the National Traffic and Motor Vehicle Safety Act, and the Highway Safety Act. The Secretary of Transportation is required to submit annual reports on the administration of these two statutes to the President for transmittal to Congress. This report is intended for wide distribution to give the public an appreciation of the gravity and persistency of the national traffic safety effort, the changes that have taken place over the years, and the purposes and scope of the programs designed to increase the safety of the motoring public which are being carried out by Federal, state, and community governments, industry, private organizations and cooperative citizens. An introductory section presents traffic accident statistics, traffic safety problems, and plans to resolve urgent problems. Examples of 1977 priority programs include automotive fuel economy; data acquisition, analysis, and reporting; occupant safety; standards enforcement and defects investigation; standards revision status; enforcement of the 55 mph speed limit; and leading causes of traffic deaths and injuries. A section on people and traffic safety covers occupant protection, traffic safety education, and pupil transportation safety. Programs for safer vehicles include vehicle structures, the Integrated Vehicle Systems program, biomechanics, vehicle handling, tires, brakes, the driver and the vehicle, state motor vehicle inspection programs, vehicle-in-use inspection standards, the Motor Vehicle Diagnostic Inspection Demonstration Project, and a special motor vehicle diagnostic inspection demonstration project. Services that improve traffic safety include traffic law adjudication, emergency medical services, training the specialists, uniformity of traffic laws, traffic records systems, police traffic services, and driver licensing, as well as motor vehicle registration, titling, and theft, and the National Driver Register. The role of the National Hwy. Traffic Safety Administration (NHTSA) as the consumer's advocate includes informing the press and the public, and serving the consumer. NHTSA's participation in international activities and organizations is outlined.

National Hwy. Traffic Safety Administration, Washington,
D.C. 20590
1978; 44p
Availability: Corporate author

HS-803 552

EMERGENCY MEDICAL SERVICES

The bibliography represents literature acquired since the establishment of the National Hwy. Traffic Safety Administration (NHTSA) as related to emergency medical services on the public highways. It is a revised and updated edition of HS-801 982, Emergency Medical Services, published in 1976 as SB-07, and covers the period Jan 1967-Dec 1977. The bibliography is comprised of NHTSA contract reports, reports of other organizations concerned with highway safety, and articles from periodicals in related fields. Citations follow the format used in the monthly abstract journal, Highway Safety Literature, and are indexed by key-word-out-of-context (KWOC) listing, author, corporate author, contract number, and report number. Documents listed may be examined in the Technical Reference

Branch, NHTSA. Availability is given in the individual citations.

by Robert Motley, comp.; Lois Flynn, comp.
National Hwy. Traffic Safety Administration, Washington,
D.C. 20590
Rept. No. SB-30; 1978; 218p
Availability: NTIS

HS-803 584

STATE OF RHODE ISLAND SPECIAL ADJUDICATION FOR ENFORCEMENT (SAFE). TECHNICAL SUMMARY. FINAL REPORT

The 1973 Highway Act authorized the U.S. Dept. of Transportation to conduct Special Adjudication for Enforcement (SAFE) demonstration projects; the first of such projects was carried out in the City of Seattle; the second project was Rhode Island's. The SAFE demonstration project operated by the Administrative Adjudication Div. (AAD) of the Rhode Island Dept. of Transportation concluded its second operational year on 30 Jun 1977, after which the AAD continued as a permanent state agency. Administrative adjudication in Rhode Island is based on a state law which has decriminalized most traffic offenses and created the AAD to dispose of these cases. The overall goal is to improve the processing and disposition of traffic offenses in terms of consistency of sanctions, the relationship of sanctions to the circumstances of the violation and the motorist's driving history, and the time to disposition. In the two demonstration years, the Rhode Island project disposed of 137,316 traffic summonses, with 100,036 fines having been paid by mail and 37,280 adjudicated at administrative hearings. The SAFE concept was successfully demonstrated as indicated by the establishment of the AAD as a state agency without major changes or problems. Rhode Island's SAFE program has employed system-initiated hearing scheduling, rather than hearings conducted on a walk-in basis. Two considerations led to this decision: importance of the availability of the driver history at the hearing, and system-initiated scheduling which permits adjustment of schedules to meet local variations in hearing loads. Other states may find that adaptations of the program are needed.

by Charles Moretti; Robert G. Ulmer
Rhode Island Dept. of Transportation, Administrative
Adjudication Div., 345 Harris Ave., Providence, R.I. 02909
DOT-HS-4-00956CA
1978; 19p
Rept. for Jul 1975-Jun 1977.
Availability: NTIS

HS-803 616

DEVELOPMENT AND CALIBRATION OF AN AERODYNAMIC DISTURBANCE TEST FACILITY. FINAL REPORT. VOL. 1: EXECUTIVE SUMMARY

The development of an aerodynamic-disturbance test facility that can be used to study the influence of crosswind disturbances on road vehicle handling is summarized. A literature review of ambient wind measurements, wind tunnel tests, and accident data was combined with driving simulator tests and closed-loop analysis to develop the requirements for a low-cost, transportable, easy-to-operate, rugged test facility. The final product consists of eight independent crosswind modules, capable of providing a relatively constant 35 mph

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gust over 130 ft test length. Arranging the modules in a semirandom fashion can provide a variable velocity profile over 230 ft test length. Each module consists of a controllable-speed, 58 hp gasoline engine driving an 8' diameter, 6-bladed propeller. Special ducting and adjustable exit vanes allow for flow redirection and expansions. Remote control of each module's fan speed and engine ignition can be accomplished from individual operating stations located up to 200 ft from the facility.

by Richard H. Klein; Henry R. Jex; Arthur A. Blauvelt; Irving L. Ashkenas
Systems Technology, Inc., 13766 S. Hawthorne Blvd.,
Hawthorne, Calif. 90250
DOT-HS-6-01403
Rept. No. TR-1085-1-1; 1978; 30p 9refs
Rept. for Jul 1976-Jun 1978. Vol. 2, Development of
Requirements and Preliminary Design, is HS-803 617; Vol. 3,
Construction, Calibration, and Operation, is HS-803 618.
Availability: NTIS

HS-803 617

**DEVELOPMENT AND CALIBRATION OF AN
AERODYNAMIC DISTURBANCE TEST FACILITY.
FINAL REPORT. VOL. 2: DEVELOPMENT OF
REQUIREMENTS AND PRELIMINARY DESIGN**

Requirements and preliminary design are described for realistic test equipment to assess the safety-related responses of vehicles to aerodynamic disturbances produced by a mechanical, yet transportable, wind generator. The first step was to develop minimal (cost-effective) requirements for such a facility including general requirements of the test facility based on potential aerodynamic disturbances, as well as those based on definition of worst-case conditions. These were studied using a literature review, accident data correlates, and an awareness of what is necessary to accomplish the overall goal. The specific wind-generator facility requirements were addressed, with a combination of experimental and analytical considerations. Based on the qualitative requirements developed for the test facility, a preliminary design of a wind-generator facility was formulated. A modular fan array was selected over two other configurations considered (a plenum duct plus sequenced side-opening ports, and stored-power drives). A preliminary design tradeoff study was made of key parameters including fan diameter and operating conditions, the power supply, and speed-control system; an operational analysis of wind-generator costs was made. Based on these studies, it was concluded that optimum design parameters are 8 ft diameter fans with individual gasoline engine drives sized for 50 mph maximum jet velocities over a core jet of 8 ft width and 6.5 height (requiring about 40 BHP (brake horsepower) to 50 BHP). These parameters are well within the range of reasonably priced commercial components.

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DOT-HS-6-01403
Rept. No. TR-1085-1-2; 1978; 81p 33refs
Rept. for Jul 1976-Jun 1978. Vol. 1, Executive Summary, is
HS-803 616; Vol. 3, Construction, Calibration, and Operation,
is HS-803 618.
Availability: NTIS

HSL 79-08

HS-803 618

**DEVELOPMENT AND CALIBRATION OF AN
AERODYNAMIC DISTURBANCE TEST FACILITY.
FINAL REPORT. VOL. 3: CONSTRUCTION,
CALIBRATION, AND OPERATION**

The construction of an aerodynamic-disturbance test facility used for assessing vehicle safety-related response characteristics, the calibration of its capabilities, and operational procedures are described. The facility consists of eight independent crosswind modules, capable of providing a relatively constant 35 mph gust over 130 ft test length. Arranging the modules in a semirandom fashion can provide a variable velocity profile over 230 ft test length. Each module consists of a controllable-speed, 58 hp gasoline engine driving an 8' diameter, 6-bladed propeller. Special ducting and adjustable exit vanes allow for flow redirection and expansion. Remote control of each module's fan speed and engine ignition can be accomplished from individual operating stations located up to 200 ft from the facility. Details, photographs, and illustrations of the various components of the test facility are provided. A parts list is appended. In order to determine the true airflow generated by different configurations of wind machines, an airflow calibration rake was constructed. This instrumentation consists of a row of 6 to 8 anemometers pulled on an open trailer 10 ft behind a test car equipped with a signal conditioning unit, a strip chart, and an FM data recorder. Calibration is discussed in terms of the effects of vane angles, velocity dissipation, effects of engine rpm on wind speed, repeatability, time variations, and effect of module spacing. The calibration results show the requirements have been met or exceeded. Three gust disturbance configurations (straight pulse, doublet pulse, and shaped profile) are outlined in terms of calibration. Operational procedures of the test facility (maintenance, start up, moving, safety aspects) are enumerated.

by Richard H. Klein; Arthur A. Blauvelt; Paul G. Van Valkenburgh
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Hawthorne, Calif. 90250
DOT-HS-6-01403
Rept. No. TR-1085-1-3; 1978; 57p
Rept. for Jul 1976-Jun 1978. Vol. 1, Executive Summary, is
HS-803 616; Vol. 2, Development of Requirements and
Preliminary Design, is HS-803 617.
Availability: NTIS

HS-803 620

**IMPROVEMENT OF ACCIDENT SIMULATION
MODEL AND IMPROVEMENT OF NARROW
OBJECT ACCIDENT RECONSTRUCTION. FINAL
REPORT**

A study was undertaken to assess the accuracy of the SMAC (Simulation Model of Automobile Collisions) computer program. The assessment was accomplished by staging three collisions and comparing the SMAC accident reconstructions to the empirical collision data. The study also undertook to modify the SMAC program to improve its accuracy for a narrow, rigid object collision. Other objectives included the reconstruction of 15 accidents involving air cushion restraint systems, and the incorporation of several modifications to the SMAC program to increase the utility and applicability of the simulation. The three staged collisions included a 1970 Chevelle impacting a rigid pole, two 1973 Chevelles impacting in a front-to-side T-collision, and two 1973 Chevelles impacting in a

Aug 31, 1979

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front-to-side, oblique collision. In each collision, the actual point of impact was within 5 in of the point planned, and the impact speeds were within 2 mph of the planned speed. Each collision was reconstructed using both pre-impact and post-impact data to determine SMAC's accuracy. The first staged collision involving a rigid, narrow object required an extensive modification to the original SMAC program, the results of which correlated exceptionally well with the first staged collision. Reconstruction of the last two collisions showed that most of the comparison parameters (positions, velocities, accelerations, and damages) were in agreement for the reconstruction and the staged collision; the lack of correlation in a few cases was felt to be attributable to tire/pavement forces, and collision forces. The methods of determining these forces need improvement. To increase SMAC utility, two program changes were made: to incorporate a nonlevel terrain simulation, and to use individual coefficients of restitution for each vehicle as input data rather than prescribing one general set to represent both vehicles.

by Mike E. James, Jr.; Hayes E. Ross, Jr.; Charles Whittington
Texas A and M Univ., Texas Transportation Inst., College Station, Tex. 77843
DOT-HS-5-01262; DOT-HS-7-01656
Rept. No. RF3258; 1978; 232p refs
Rept. for 30 Jun 1975-31 Jan 1977, and for 29 Jun-28 Aug 1977.
Availability: NTIS

HS-803 679

IMPACT OF MOTORCYCLE HELMET USAGE IN COLORADO: AN EXECUTIVE SUMMARY. FINAL REPORT

A study was undertaken to assess injury consequences to motorcyclists involved in crashes in the State of Colorado, with particular emphasis on the differences in frequency, severity, and location of injuries between helmeted and nonhelmeted riders; and to assess the impact of the repeal of Colorado's helmet law on helmet usage throughout the state. Data collection efforts were undertaken during Jul-Sep 1976 (pre-repeal data) and during the same months of 1977 (post-repeal data). Findings pertaining to injury consequences were derived from in-depth medical evaluation of 1700 motorcycle riders involved in accidents during both time periods. The Abbreviated Injury Scale was used by medical personnel to standardize injury data. Selected findings include the following: substantial increase in the fatality and critical injury rates from the pre-repeal to the post-repeal period; considerably lower fatality and critical injury rates among helmeted vs. nonhelmeted motorcyclists; significant influence of helmet use on rates of injury to the head, neck, and face (far lower injury rate for helmet wearers in all body locations); and significantly greater severity of injuries to the head for helmetless vs. helmeted riders. Findings from the roadside helmet survey are based on observations of 16,000 riders for 1976 and 24,500 riders for 1977 at randomly-selected sites throughout the state. The findings indicate that helmet use in Colorado prior to repeal approached perfect compliance with the law (99% usage), and that after repeal, use of helmets dropped to 58%. Post-repeal data show

the highest rate of helmet usage to be 72% on rural freeways, with the lowest rate being 47% on urban four-lane streets.

by Charles E. Dare; J. Cuthbert Owens; Sigmund Krane
Colorado Dept. of Highways, Div. of Hwy. Safety, 4201 E. Arkansas Ave., Denver, Colo. 80222
DOT-HS-6-01429
Rept. No. 403-2-A; 1978; 32p
Rept. for Jul 1976-Sep 1977.
Availability: NTIS; Corporate author

HS-803 681

IMPACT OF MOTORCYCLE HELMET USAGE IN OKLAHOMA. FINAL REPORT. VOL. 1: RESEARCH REPORT

Data was compiled from all accident reports involving motorcycles for Jul-Sep 1976 and 1977 filed by the Oklahoma Hwy. Patrol and the police departments of Norman, Lawton, Tulsa, and Oklahoma City. For the 1977 data collection period, supplementary accident forms were obtained, containing additional data related to the accident, motorcycle, and riders. Medical records of injured motorcyclists were examined and the nature of the injuries recorded in accordance with the Abbreviated Injury Scale. Roadside observations of motorcyclists were made from late Jun through Sep 1977 throughout the state in order to estimate helmet usage among the general population of riders. It was found that among those persons sustaining nonfatal injuries, the majority of injuries were to the extremities; this was true whether or not the person wore a helmet. While less than 1 out of 10 helmeted riders received their most severe injury to the head, neck, or face, more than 1 out of 4 nonhelmeted riders sustained their most severe injury in one of these regions. The helmet usage rate among fatally-injured riders was less than half the rate among the nonfatally-injured riders. There was also a significant difference in severe injuries sustained by nonhelmeted vs. helmeted riders. In none of the injury or fatality cases was there any direct indication that a helmet had caused or contributed to the injury. The helmet usage survey found that 52.4% of the riders were using their helmets.

by Alan L. Dorris; Jerry L. Purswell
Oklahoma Hwy. Safety Office; Univ. of Oklahoma, School of Industrial Engineering, 202 W. Boyd, Norman, Okla. 73019
DOT-HS-6-01483
1978; 76p 16refs
Rept. for Jan 1977-Jul 1978. Vol. 2, Supplemental Data/Appendix, is HS-803 682.
Availability: NTIS

HS-803 682

IMPACT OF MOTORCYCLE HELMET USAGE IN OKLAHOMA. FINAL REPORT. VOL. 2: SUPPLEMENTAL DATA/APPENDIX

Statistical data are tabulated on motorcycle accidents which occurred in Oklahoma during Jul, Aug, Sep, 1976 and 1977, and roadside observations of helmet usage by motorcyclists in the state during the period late Jun through Sep 1977. Motorcycle accident data and supplementary accident information from police and medical authorities, frequency and severity of injury (Abbreviated Injury Scale) to specific body areas

HS-803 683

sustained by motorcycle riders, and motorcycle usage rates are reported.

by Alan L. Dorris; Jerry L. Purswell
Oklahoma Hwy. Safety Office; Univ. of Oklahoma, School of Industrial Engineering, 202 W. Boyd, Norman, Okla. 73019
DOT-HS-6-01483
1978; 239p
Rept. for Jan 1977-Jul 1978. Vol. 1, Research Rept., is HS-803 681.
Availability: NTIS

HS-803 683

FORD FAIRMONT WEIGHT REDUCTION BASELINE DATA. FINAL REPORT

A weight study was conducted of the Ford Fairmont 4-door sedan with 4-cylinder engine and 4-speed manual transmission. The vehicle teardown was limited to the detail necessary to project near-term weight reduction for automotive fuel economy studies. As an example, the engine assembly was not disassembled completely; but rather, the head and all attached components were removed to arrive at an accurate weight for the cast-iron head. These data then can be used to arrive at an accurate weight estimate for an aluminum head. The cast-iron block assembly, on the other hand, was not disassembled as it was assumed that it would remain cast iron. A complete sectioning of the body was done in order to provide a clear understanding of the Fairmont structure and its corresponding weight. A complete weight summary of the entire car, a copy of the Vehicle Label from the car used for the study, and photographs are provided. Parts lists and photographs of the key weight components of each group are presented. The parts lists include component description, quantity per car, total weight per car, material description, method of fabrication, and gauge thickness.

by Harold M. Siegel; Jerar Andon
South Coast Technology, Inc., P.O. Box 3265, Santa Barbara, Calif. 93105
DOT-HS-7-01790
1978; 106p
Rept. for Apr-Sep 1978.
Availability: NTIS

HS-803 705

SCHOOL BUS CARBON MONOXIDE INTRUSION. TECHNICAL REPORT

The findings are reported of a voluntary test program to measure carbon monoxide (CO) levels in school buses which was conducted by personnel from the National Hwy. Traffic Safety Administration, the Environmental Protection Agency, and state or private school bus agencies. The tests were made during a 10-month period in 1976 and 1977 under different climatological conditions, in order to determine whether or not there were any serious CO intrusion problems or indications of potential problems in a small (not statistically-significant) sample of the nation's school buses. The 645 tests conducted in all areas of the U.S., under varying test conditions, used test equipment with different accuracies. Test results show that, based on a recommended level of 20 ppm, 7.2% of the buses exceeded this level, and 5.4% had maximum CO readings above 50 ppm. Recommendations include development of advisories for concerned state, local, and private school bus agencies to define necessary maintenance and inspection

HSL 79-08

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procedures that will reduce or eliminate the CO intrusion problem, promulgation of a standard defining maximum allowable CO levels for school buses, and additional testing under controlled conditions and with an expanded data base.

by James S. Clements
National Hwy. Traffic Safety Administration, Office of State Vehicle Programs, Washington, D.C. 20590
1978; 59p 19refs
Availability: NTIS

HS-803 706

AUTOMOTIVE FUEL ECONOMY CONTRACTORS' COORDINATION MEETING, DECEMBER 11-13, 1978. SUMMARY REPORT

A comprehensive research and analysis program is underway to support the fuel economy rulemaking activities of the National Hwy. Traffic Safety Administration, the objectives of which are to develop, maintain, and update the data bases (statistical, technological, engineering, manufacturing, cost, financial, economic, marketing, and other national impacts), and the analytical tools (framework, methodologies, and specific approaches) necessary to evaluate rulemaking and policy formulation activities in automotive energy conservation. Implementation of this support program is being carried out primarily through a private-sector contract program. In order to provide the status of these contractual efforts, and to have an opportunity for interaction among the program participants and other interested parties, Contractors' Coordination Meetings are held. This compilation consists of 20 papers (in various formats) to be presented at the 2nd Automotive Fuel Economy Res. and Analysis Prog. Contractors' Coordination Meeting in Washington, D.C. on 11-13 Dec 1978. The papers, which describe the various research and analysis programs in terms of objectives and progress, are grouped under the following subject headings: fuel economy and emissions considerations, motor vehicle demand forecasting, consumer research, engines, weight reduction, and industrial behavior.

National Hwy. Traffic Safety Administration, Technology Assessment Div., Washington, D.C. 20590
1978; 426p refs
Availability: NTIS

HS-803 708

THE NATIONAL PARTS RETURN PROGRAM. FINAL REPORT [AUTOMOTIVE COMPONENT FAILURES REPORTED TO THE NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION]

The operation and maintenance of the National Parts Return Program (PRP) from 1 Jul 1977 through 30 Jun 1978 are described. Through the PRP, failed automotive components and information are submitted voluntarily to the National Hwy. Traffic Safety Administration (NHTSA) by independent repair facilities. Information on these components assists NHTSA's Office of Defects Investigation (ODI) in identifying potential safety-related defects in automotive components. NHTSA can require manufacturers to conduct safety defect recall campaigns when it has been determined that a safety-related defect exists. The information obtained from these returned parts is valuable in preparing Federal Motor Vehicle Safety Standards. Emphasis during the 1978 fiscal year was placed on improving the quality of the parts received, continu-

ing to increase inputs on newer model vehicles, and introducing the information report forms for strengthening the "information only" aspects of the program. The PRP experienced an increase of 88% in the number of contributions of parts and information which related to an ODI engineering analysis or investigation. There was also a 100% increase in the number of contributions which related to a current recall campaign. Information on newer vehicles increased slightly over the 1977 FY; a further increase is anticipated, but vehicles out of warranty will continue to account for a majority of PRP inputs. The introduction of an information report form, to be used in those instances in which a part is not available, was a major change during the reporting period. There was also a change in the style of the PRP "News"; the newsletter layout was altered from two to three columns, shorter articles were emphasized, greater care was taken to keep members up-to-date on current defect investigations, and a new item, "The Forum" was introduced, offering short notices on problems reported by individual members. Appended are a newsletter matrix (tabulated data regarding newsletter issues), failed parts summary, copies of newsletters, cumulative report of parts received, PRP materials, data transcription instructions, and repair shop ID operational procedures.

by B. Beddow; M. Lowery; R. Cashman; V. Nash
Kappa Systems, Inc., 1501 Wilson Blvd., Arlington, Va. 22209
DOT-HS-6-01433
Rept. No. KAPPA-DOT-78-03; 1978; 259p
Rept. for 1 Jul 1977-30 Jun 1978.
Availability: NTIS

HS-803 711

PERFORMANCE EVALUATION OF TEST DUMMIES WITH FLESH PARTS PRODUCED WITH SUBSTITUTE FOAMING COMPOUNDS. FINAL REPORT

A research effort was undertaken to determine if Part 572 anthropomorphic dummy component flesh parts molded with Nitrosan and with alternate foaming materials designated as Compound A and Compound B resulted in different performance characteristics. Differences in characteristics, if any, were to be defined in terms of the weight and external dimensions of dummy segments, measurements of component static and dynamic performance in accordance with test procedures specified in 49 CFR, Part 572, and measurements of whole dummy performance based on replicate accelerator sled tests performed in three test configurations. Data from the series of physical measurements support the conclusion that no important physical differences result from use of the two flesh foams considering practical measurement and fabrication tolerances. Substitution of either Compound A or Compound B flesh in place of Nitrosan does not preclude conformance of measured data to Part 572 criteria. No single compound, Nitrosan or either of the substitutes, is uniformly superior in terms of measurement repeatability. Conclusions about the effects of flesh foam substitution perhaps are most strongly supported by the results of statistical analyses of repeatability and reproducibility of sled test measurements. Considering the inherent measurement variability characteristic of complex impact test environments, the results of the statistical analyses fail to show any systematic difference in dummy dynamic per-

formance which can be attributed to the type of flesh foam compound.

by Daniel E. Massing; Kenneth N. Naab
Calspan Corp., P.O. Box 400, Buffalo, N.Y. 14221
DOT-HS-6-01514
Rept. No. CAL-ZM-6015-V-1; 1978; 188p 6refs
Rept. for Mar 1977-Jul 1978.
Availability: NTIS

HS-803 713

PERCEIVED IMPORTANCE OF ZONES SURROUNDING A VEHICLE AND LEARNING TO USE A CONVEX MIRROR EFFECTIVELY. FINAL REPORT

Several experimental studies were conducted to obtain data pertinent to the adaptability of drivers to the use of right outside rear-view mirrors. There seems to be a general consensus that such mirrors would facilitate a driver's task and reduce accident rates. A previous study demonstrated that a group of driver educators, through use of the pair-comparison technique, attached greater importance to zones to the right of a driver than to his left. Numerical weightings were generated for a relatively large number of zones. The present investigation, in part, replicated the earlier study for groups of individuals varying in age and driver experience. The results confirm the earlier findings, indicating that mere exposure to the driver's situation provides sufficient bases for judging the importance of surrounding zones. Additional experimental work revealed that the higher weightings given to the right-hand zones were primarily, if not entirely, due to the greater difficulty of seeing those zones. Also investigated were the effects of training on judgments of vehicle distances and speeds as viewed through a 50-in convex mirror. Subjects varying in age and driving experience were given 192 trials over four test sessions. The most superior performing group, one having several years of convex mirror usage, produced more accurate judgments than a control group which viewed the vehicle images on plane mirrors.

by Russell L. Smith; Marlene C. Bardales; William J. Burger
Vector Res., 1550 17th St., Santa Monica, Calif. 90404
DOT-HS-7-01791
1978; 108p 30refs
Rept. for Sep 1977-Sep 1978.
Availability: NTIS

HS-803 714

ALCOHOL AND HIGHWAY SAFETY 1978: A REVIEW OF THE STATE OF KNOWLEDGE. FINAL REPORT

Both the nature of the alcohol-crash problem and societal responses to the problem are treated in this comprehensive review and analysis of existing knowledge about alcohol and highway crashes in the U.S. A section on the alcohol-crash problem describes the nature and extent of the highway safety problem attributable to drinking-driving. Evidence (primarily epidemiologic) is presented, linking alcohol presence in the blood to the various types of crashes, the risk posed by these crashes to drinking and nondrinking drivers is described, and the societal costs of such crashes are measured. The state of knowledge is considered concerning the effects of alcohol on human behavior in general and driving performance in particu-

lar; brief descriptions are presented of the biochemical, physiological, and behavioral effects of alcohol and their possible relationships to impairment of body functioning and driving performance. A section on people who drink and drive discusses the characteristics of people who are over-represented in alcohol-related (A/R) crashes, and attempts to shed more light on groups of people whose drinking-driving behavior seems to create abnormally high highway crash risk. Worldwide patterns of drinking are briefly discussed, types of U.S. drinkers are defined according to their drinking patterns, and drinking-drivers are characterized by various attributes, those using the road and those involved in crashes. Dealing with the alcohol-crash problem is treated in a section which describes and evaluates past efforts to reduce alcohol-crash risk in the U.S. and elsewhere. A section outlines short-term future directions of the alcohol-crash problem. It is indicated that the absolute magnitude of the alcohol-crash problem will increase substantially over the next decade, with A/R crash losses comprising the same fraction of total crash losses. To achieve any important reduction in these projected losses requires a widening of possible targets of future programs, fundamental changes in approaches used in past alcohol safety programs and development of new programs for new targets, refinement of innovative ways of applying modern technology to the alcohol-crash problem and more use of the systems approach, and careful design and implementation of evaluation components for countermeasure programs.

by Ralph K. Jones; Kent B. Joscelyn
University of Michigan, Hwy. Safety Res. Inst., Huron Pkwy.
and Baxter Rd., Ann Arbor, Mich. 48109
DOT-HS-5-01217
Rept. No. UM-HSRI-78-5; 1978; 220p 324refs
Rept. for Sep 1975-Dec 1977. For summary report, see HS-803
764.
Availability: NTIS

HS-803 716

IDENTIFICATION OF SPECIFIC PROBLEMS AND COUNTERMEASURES TARGETS FOR REDUCING ALCOHOL RELATED CASUALTIES. FINAL REPORT

A sample of 7421 police reports of traffic accidents in eight contiguous counties comprising western New York State was analyzed in terms of accident characteristics and driver behaviors. Data on the problems of drinking drivers was sought to provide a basis for countermeasures. Analyses were conducted to profile the drinking drivers with nondrinking drivers according to the nature of the accident generation, accident situations, and driver characteristics. Driver drinking status and culpability were studied in conjunction with driver accident and conviction records. Nine specific accident types were developed, with the following four classes accounting for 70% of the drinking drivers' accidents: Class R, involving running off the road or striking a parked vehicle, due to the failure to maintain one's path (42% of drinkers' accidents vs. 18% for nondrinkers); rear-end accidents, involving a vehicle continuing along its path to strike a slower or temporarily-stopped vehicle ahead (14% vs. 18%); stationary-target-ahead accidents, generally involving continuing along one's path to strike a parked vehicle ahead (8% vs. 4%); and parallel opposite-lateral move, typically involving a lane departure (but not a turn) to the left to strike an oncoming vehicle (7% vs. 5%). Other major findings include an extremely high culpability rate for drinkers, a propensity for drinkers to have accidents in low-demand situations, an overrepresentation of the young among the drinkers (but somewhat less than among the

nondrinkers), and a higher proportion of drinkers in accidents among drivers with previous drinking convictions. In almost all analyses of accident characteristics, driver behaviors, police citations, and accident situations, approximately half or more of the comparisons showed those driving while intoxicated (blood alcohol level (BAL) of 0.10% or higher) were more similar to drivers not under the influence of alcohol than were those drivers who had been drinking (below 0.10% BAL).

by Kenneth Perchonok
Calspan Field Services, Inc., 4455 Genesee St., Buffalo, N.Y.
14225
DOT-HS-4-00945
Rept. No. CAL-ZS-5547-V-1; 1978; 249p 4refs
Rept. for Jun 1974-Aug 1978.
Availability: NTIS

HS-803 719

1978 SURVEY OF PUBLIC PERCEPTIONS ON HIGHWAY SAFETY. FINAL REPORT

A scientifically-selected, national sample of 1500 licensed drivers in the U.S. was interviewed by telephone between 28 May and 7 Jun, 1978 to obtain their attitudes, knowledge, and behavior about the 55 mph speed limit, safety belts, 1984 requirements for air bags or similar passive restraint systems, and driving after drinking. The survey assessed drivers' awareness of public information and education, (PI and E) campaigns, and their perceptions of accident risk. It was found that the public supports the national speed limit, that drivers believe that speeds within a 5 mph tolerance range should be considered acceptable compliance with the law, that drivers favor strict enforcement for speeds over 60 mph, and that safety is considered the major benefit of the 55 mph law. It was found that less than one-fourth of the drivers use a safety belt, and that 54% of the public favor mandatory safety belt legislation. The survey showed that 73% of drivers support the 1984 passive restraint requirement, that support and knowledge of how air bags work are strongest among younger drivers, that frequent safety belt users support the requirement more than infrequent users, and that the "government infringement on personal freedom" argument is leveled against the 1984 requirement less frequently than it is against a mandatory safety belt use law. It was determined that the public views avoiding drinking and driving as the most important countermeasure to reduce traffic fatalities, that more than a third of the drivers report discussing drunk driving with someone and intervening to prevent drunk driving despite reduced PI and E campaign activity, that drivers who are frequently in alcohol-related situations have more accidents than nondrinking drivers, and drivers who remember PI and E messages about drunk driving report intervening more frequently to prevent someone from driving drunk. Accident risk perception was not found to differ among males and females but was found to diminish progressively among older drivers. Accident-involved drivers had a higher perception of risk than accident-free drivers. Almost all drivers expressed considerable confidence in their control in preventing accidents.

Teknekron, Inc., 4701 Sangamore Rd., Washington, D.C.
20016
DOT-HS-6-01424
1978; 98p
Rept. for May-Nov 1978.
Availability: NTIS

Aug 31, 1979

HS-803 773

HS-803 764

ALCOHOL AND HIGHWAY SAFETY 1978: A REVIEW OF THE STATE OF KNOWLEDGE. FINAL REPORT. SUMMARY VOLUME

by Ralph K. Jones; Kent B. Joscelyn
University of Michigan, Hwy. Safety Res. Inst., Huron Pkwy.
and Baxter Rd., Ann Arbor, Mich. 48109
DOT-HS-5-01217
Rept. No. UM-HSRI-78-9; 1978; 123p 324refs
Rept. for Sep 1975-Dec 1977. For abstract, See HS-803 714.
Availability: NTIS

HS-803 771

A SYSTEM FOR DIAGNOSIS, REFERRAL, AND REHABILITATION OF PERSONS CONVICTED OF DRIVING WHILE INTOXICATED. FINAL REPORT. VOL. 1: THE SYSTEM AND A PRELIMINARY FIELD TEST OF THE DIAGNOSTIC PROCEDURE

A diagnosis, referral, and treatment program developed for DWI (driving while intoxicated) offenders is described which differs in several ways from traditional methods. The diagnosis involves a structured interview which assesses the individual on the factors of adaptability to the stress and/or inner conflicts of life; the sociocultural environment, in terms of alcohol use and abuse, in which the person lives and was raised; and the degree to which the person's own alcohol consumption interferes with functioning in everyday life. Once the diagnosis is made, a set of rehabilitation objectives is formulated by assessing the individual according to the diagnostic framework and deciding what changes in the individual would prevent DWI offenses and related behavior in the future. The individual is then referred to the rehabilitation program (educational activities, therapeutic activities, or some combination) which is most likely to help that individual accomplish rehabilitation objectives. A preliminary field test of the structured interview using a limited number of DWI offenders revealed construct validity for aspects of all three diagnostic factors. A limited criterion validity study demonstrated some support for the factors. It was concluded that a representative sample of DWI's would have to be tested with the interview before any definitive conclusions could be made about the diagnostic technique. A detailed manual for administering the interview is included, containing a detailed description of the questions, intent, techniques for inquiry, and techniques for coding the person's responses.

by Richard E. Boyatzis
McBer and Co., 137 Newbury St., Boston, Mass. 02116
DOT-HS-5-01253
1978; 143p 17refs
Rept. for 1975-1978. Vol. 2, A Special Rehabilitation Prog. for Multiple Offenders, is HS-803 772.
Availability: NTIS

HS-803 772

A SYSTEM FOR DIAGNOSIS, REFERRAL, AND REHABILITATION OF PERSONS CONVICTED OF DRIVING WHILE INTOXICATED. FINAL REPORT.

VOL. 2: A SPECIAL REHABILITATION PROGRAM FOR MULTIPLE OFFENDERS

A detailed description is presented of a special rehabilitation program for multiple DWI (driving while intoxicated) offenders. The program is part of a diagnosis, referral, and rehabilitation program for DWI offenders that involves assessing an individual on three factors (adaptability, sociocultural, severity) using a structured interview, formulation of rehabilitation objectives, and referral to a rehabilitation program for accomplishing these objectives. The rehabilitation program for multiple DWI offenders uses a group therapy approach, and activities designed to use experiential learning as the main treatment technique. It consists of 34 sessions conducted over a period of 52 weeks; clients spend a total of 84 hours in group sessions. Topics for each session have been designed to help a client develop specific, practical skills and orientations which will help him lead a satisfying and productive life without alcohol abuse and related behaviors. The instructor's guide is presented which includes an overview, discussion of conceptual foundations, detailed instructions on conducting each session (including objectives, materials needed, actions, and additional background information), and appendices (relaxation exercises, physical exercises). The client journal (i.e. materials which a participant would use during the program) is also presented.

by Richard E. Boyatzis
McBer and Co., 137 Newbury St., Boston, Mass. 02116
DOT-HS-5-01253
1977; 248p 15refs
Rept. for 1975-1978. Vol. 1, The System and a Preliminary Field Test of the Diagnostic Procedure, is HS-803 771.
Availability: NTIS

HS-803 773

EVALUATION OF 2-D ANTHROPOMORPHIC TEMPLATE ("OSCAR") AND 3-D ANTHROPOMORPHIC DEVICE (H-POINT MACHINE) IN RELATION TO HEIGHTS AND BODY PROPORTIONS OF AMERICAN DRIVERS. FINAL REPORT

In order to assess whether the selected height, variability and limits of the 3-D anthropomorphic device (H-point machine) and the 2-D template ("Oscar"), used in the design and development of vehicle seating compartments, are appropriate to today's drivers, a literature search was conducted, using census data as a guide, of available studies made since 1960 regarding heights and body proportions of groups representing major components in the U.S. population. These standards, proposed in 1961, were based on height and weight figures reported for large numbers of male Texas drivers, male cadavers, and U.S. soldiers. At that time, an average height of 68.45" and a standard deviation of around 2.65" were taken as the "standard human" to which vehicles were to be fitted. Equipment was to be sized so that people as tall as the 95th percentile of this population, around 73.00", or as short as the 10th percentile, about 65.50", could be accommodated. Recent physical measurements of American women, teenagers, ethnic minorities, and other subpopulations of U.S. drivers indicated that 70% of American women are shorter than 65", as are most drivers under the age of 18, and most drivers of Latin American, Amerindian, Asiatic, and other ancestries. It is likely that at least 50%, and possibly 60% of American drivers are shorter than 65" and therefore not accommodated by these

HS-803 777

anthropomorphic devices. Body segments of these subgroups are even less likely to be accommodated. Except for some Europeans, most non-U.S. drivers are from short populations, and would not be accommodated.

by L. E. St. Hoyme; P. S. Gindhart
Anthro-Services, P.O. Box 1774, Hyattsville, Md. 20788
DOT-HS-NHTSA-6-5262
1976; 75p 74refs
Rept. for 1975-1976.
Availability: NTIS

HS-803 777

AUTOMOTIVE FUEL ECONOMY PROGRAM. THIRD ANNUAL REPORT TO THE CONGRESS

A comprehensive analysis is given of the Automotive Fuel Economy Prog. established by the Energy Policy and Conservation Act of Dec 1975 which required that the automobile industry almost double the fleet-average fuel economy of passenger cars over the 1975 to 1985 decade, raising fleet-average fuel economy from slightly less than 14 mpg for the 1974 model year to 27.5 mpg by the 1985 model year, and requiring the Secretary of Transportation to administratively establish passenger car fuel economy standards for 1981 through 1984, and light truck fuel economy standards beginning with the 1979 model year. At this point, fuel economy standards have been promulgated for passenger cars for the 1981-1984 model years and for light trucks for the 1979-1981 model years. Specifically addressed in this analysis is the ability of motor vehicle manufacturers to meet the 27.5 mpg standard for 1985 passenger cars. An examination is given of the manufacturer's capability to comply with each of the present fuel economy standards, as well as an evaluation of the Automotive Fuel Economy Prog.'s impact on conservation of fuel, the U.S. dependence on foreign petroleum sources, the consumer, the auto industry, and the national economy. The structure of the program is examined, with recommendations for modifications. The fuel economy labeling program and the Federal fleet purchasing program are discussed. The utilization of advanced automotive technology is examined as well. It is concluded that the fuel economy levels specified in the statute can be achieved by all domestic manufacturers without a significant change in the mix of their fleet and without reliance on diesel engines. It is also concluded that both the consumer and the national economy are better off as a result of this fuel economy program, especially in view of the increased price of oil.

National Hwy. Traffic Safety Administration, Washington, D.C. 20590
1979; 158p refs
Availability: Corporate author

HS-803 798

RSV PHASE 3 [RESEARCH SAFETY VEHICLE]. PROGRESS REPORT, AUGUST/SEPTEMBER 1978

A status review of all Phase 3a tasks and an update of the task cost and schedules were begun in order to define the performance objectives for the Minicars Research Safety Vehicle (RSV) for fiscal years 1979 and 1980. A detailed estimation of the Phase 3b effort also was started; consideration is being given to three combinations of demonstration and crashers RSV's (10 demonstrations and 7 crashers, 10 demonstrations and 3 crashers, and 8 demonstrations and 2 crashers). Progress

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is reported according to task section and summarized to the subtask level. The following tasks are covered: product improvement of inflatable restraints, structural refinement, plastics development, electronics (Appendix E), handling and braking, compatibility analysis, high technology engine/transmission, structures fabrication, systems fabrication, accident/benefit analysis (Appendix G), large RSV (LRSV), production planning, tooling, and Phase 3b. Appended are data traces (injury measures) for RSV driver restraint system sled tests using instrumented dummies, traces from bumper tests, descriptions of procedures for filling RSV structures with polyurethane foam, and subcontractor progress reports (electronics, RCA Labs. and Dubner Computer Systems, Inc.; analysis of contact point distributions of unrestrained occupants, Kinetic Res., Inc.; LRSV development engine, Volvo of America); and Minicars memorandum on gearing for LRSV.

Minicars, Inc., 55 Depot Rd., Goleta, Calif. 93017
DOT-HS-7-01552
Rept. No. PR-Aug-Sep-1978; 1978; 165p
Availability: Reference copy only

HS-810 337

REMARKS BEFORE THE MOTOR AND EQUIPMENT MANUFACTURERS ASSOCIATION CONFERENCE, BOCA RATON, FLORIDA, DECEMBER 8, 1978

The efficacy of Federal motor vehicle regulation depends largely on the initiative, ingenuity, and innovative efforts of the motor and equipment manufacturers. Regulatory interests, both of the National Hwy. Traffic Safety Administration (NHTSA) and the automotive equipment manufacturers, intersect directly in three ways: through NHTSA's safety standards program, through the fuel economy program, and through defect recall campaigns. Advanced concepts can be developed by the automotive supplier industry for improved safety or fuel economy and tried on research safety vehicles. A great many of the technical improvements in the automobile (materials, components, systems) in recent years have germinated in the research and development activities of the supplier industry. NHTSA is confident that the supplier industry will continue to make important contributions to automotive progress in the discovery and development of new technologies. The supplier industry has responsibilities with regard to defect recall campaigns, i.e. the reporting of defects to NHTSA, and the notification of purchasers when recalls are required. NHTSA favors diagnostic periodic motor vehicle inspection (PMVI). These programs are feasible, effective and publicly acceptable. When properly designed and administered, they can reduce motor vehicle operating costs significantly; inspected vehicles have better safety equipment, deliver better mileage, and emit fewer pollutants. The separation of inspection and repair functions would foster greater public confidence in each. The equipment industry could contribute to the capability of small automotive repair establishments to participate in such a PMVI program by developing inexpensive, accurate, simple diagnostic tools. Small individual repair operators could pool resources to provide specialized services.

by Joan Claybrook
National Hwy. Traffic Safety Administration, Washington, D.C. 20590
1978; 11p 1ref
Availability: Corporate author

Aug 31, 1979

HS-810 337

HS-900 020

FINANCIAL MANAGEMENT OF STATE HIGHWAY SAFETY PROGRAMS. INSTRUCTOR MATERIALS

A manual is provided for teaching a course in the financial management of state highway safety programs, the information directed toward the person responsible for day-to-day course instruction. People who would benefit from this instruction include, but are not limited to, financial managers of state highway safety programs; highway safety program administrators at the regional, state, and local levels; and other personnel, such as auditors and evaluators, newly assigned to highway safety programs. The course has been designed to be taught over a three and one-half day period. Fourteen 90-minute sessions make up 21 hours of instruction. The content of each day's instruction has a single theme. Each of the first three days contains four 90-minute sessions, the last day having two. Each theme corresponds to a major phase in the financial management of state highway safety programs (planning, initiating, administering, and closing). The activity of assessing whether the course has met its desired objectives is accomplished through a testing program measuring participant mastery of course material, and evaluation by participants, instructors, and/or observers. The guide is divided into four sections: introduction (course goals, purpose of instructor materials, course schedule, session descriptions); methodology (description of suggested ways of conducting instructional and application sessions, conduct of instructional and application sessions, uses of tests and evaluation); areas of special emphasis (guidelines to ensure effective instruction); and sessions (session description, objectives, outline of activities, instructional aids, equipment needed).

by Arthur Iwanicki

Dunlap and Associates, Darien, Conn.; National Public

Services Res. Inst., Alexandria, Va.

1978; 331p

State Highway Safety Program Financial Management.

Instructor Materials. See also HS-900 019. Financial Managers.

Availability: NHTSA General Services Div.

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BioTechnology, Inc.

ADVANCED DRIVER TRAINING EVALUATION AND DEVELOPMENT

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California Dept. of Motor Vehicles, Div. of Drivers

Licenses, P.O. Box 1828, Sacramento, Calif. 95809

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Section, Sacramento, Calif. 95809

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California Hwy. Patrol, P.O. Box 898, Sacramento, Calif. 95804

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California Inst. of Tech., Jet Propulsion Lab., 4800 Oak Grove Drive, Pasadena, Calif. 91103

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Calspan Corp., P.O. Box 400, Buffalo, N.Y. 14221

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Calspan Field Services, Inc., 4455 Genesee St., Buffalo, N.Y. 14225

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Colorado Div. of Wildlife, 6060 Broadway, Denver, Colo. 80216
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Country Roads Board (Victoria), 60 Denmark St. Kew, Vic. 3101, Australia
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Defense Science and Technology Organisation, Aeronautical Res. Labs., P.O. Box 4331, Melbourne, Vic., 3001 Australia
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Department of Transportation, Office of Hazardous Materials Operations
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Department of Transportation, Office of Public and Consumer Affairs, Washington, D.C. 20590
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Dunlap and Associates, Darien, Conn.
FINANCIAL MANAGEMENT OF STATE HIGHWAY SAFETY PROGRAMS. INSTRUCTOR MATERIALS
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Economics and Science Planning, Inc., 1200 18th St., N.W., Suite 610, Washington, D.C. 20036
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Honeywell Inc., Defense Systems Div., 2600 Ridgway Pkwy., Minneapolis, Minn. 55413
VEHICLE DETECTION. PHASE 3: PASSIVE BUS DETECTOR/INTERSECTION PRIORITY SYSTEM DEVELOPMENT. OPTION 2: MANUFACTURING DRAWINGS AND PROTOTYPE DEVELOPMENT. OPERATION AND MAINTENANCE MANUAL
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HUK-Verband, Leopoldstrasse 20, 8000 Munchen 40, Germany
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**JHK and Associates, San Francisco, Calif. and Tucson,
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**Massachusetts Inst. of Tech., Energy Lab., Cambridge,
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**Michigan Dept. of State Police, Office of Hwy. Safety
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**Motor Vehicle Manufacturers Assoc. of the United
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A COMPARISON OF MOTOR VEHICLE SAFETY
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**National Hwy. Traffic Safety Administration, Office of
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New Jersey Dept. of Transportation, 1035 Parkway Ave., Trenton, N.J. 08625
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Princeton Univ., Dept. of Aerospace and Mechanical Sciences, Princeton, N.J. 08540

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Systems Technology, Inc., 13766 S. Hawthorne Blvd., Hawthorne, Calif. 90250

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**Technischen Überwachungs-Verein Rheinland, Institut
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Rheinland e.V., Postfach 10 17 50, 5000 Köln 1, West
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Traffic Injury Res. Foundation of Canada, 1765 St.

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**University of Cambridge, Dept. of Engineering,
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